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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

POTATO PLANTING.

From the Farmers' Cabinet.

Sir—On a late visit, which I paid to an intelligent friend and excellent agriculturist, I found him in his field planting potatoes, after a method which I consider about as near perfection as may be desired; and the simplicity and ease with which it might be adopted for general culture are, to me, amongst its greatest recommendations. I speak with confidence when I recommend this mode of practice, for I have used it very extensively myself, and have found it the quickest as well as the least expensive, the easiest as well as the most certain mode of procedure, which I have tried or seen adopted. The only difference between my friend's management and that of my own was, he planted under a turf sod, with once ploughing, while I always plough the land designed for portatoes early in the autumn, deep, and well up, and so it lies until the spring: the after culture, and before I plant my crop, leaves me but little to do in the way of cleaning and hoeing amongst the crop, it being my plan to completely eradicate the weeds and pulverize the soil, before planting the potatoes, when double the labor in half the time, and at half the expense, can be given for the purpose.

His method after this was like my own—the surface of the land had been spread with half-fermented manure, and in a furrow which had been thrown out adjoining the fence, potato sets were dropped, at the distance of fourteen inches apart, and upon these the dung of the two next furrows in width was raked and spread carefully; the plough, on again passing, turning a furrow upon it and the sets, and making as good work as I ever expect to see. The next furrow had no potatoes planted in it, and no dung, so the sets were planted in every alternate furrow, and these had the whole of the dung: thus the work was finished in the easiest, quickest, and most perfect manner imaginable.

Now, in all other sod-ploughings for planting, I have been dissatisfied with the rough and uneven state in which the land had been left after the plough, and on which the harrows would operate to much disadvantage, and often to an injurious extent, pulling over the half-turned sods, which would require to be replaced by hand, and even then the work would be left ill done. My friend had, I believe I may say, *invented* a machine by which this inconvenience and injury were prevented, and for this, if it be his own invention, he deserves a premium—it was merely the iron tire of a broad wagon wheel, which was dragged horizontally on the surface of the ground by a longer or shorter chain, so as to elevate the front to a certain degree to enable it to work properly; and by this very simple contrivance, the surface was cut as smooth as it could have been by the hoe, and the pulverized earth was dragged and deposited in the hollows, as well as it could have been done by the shovel; the land being thus as effectually worked and levelled as by harrow and roller. The use of this very simple machine is calculated to save immense labor and time; but my friend could not be prevailed upon to communicate its use for the benefit of his neighbors; I have, therefore, undertaken to do it, conceiving that it ought to be made known for the good of the community.

In conclusion, I have known upwards of seven hundred bushels of potatoes grown per acre, by the above mode of planting, which required one flat hoeing only by hand for the destruction of the seed weeds—the root weeds having all been gathered and removed before planting the crop—they were not moulded in the slightest degree; and to this circumstance, in conjunction with careful management in planting, must be attributed the great yield of the crop, as also the quality, which was very superior, the bulbs being all of a good size, and not deformed by those knobs which are so common on those that have been raised by repeated mouldings—would our friends think on these things? A SUBSCRIBER.

MAKING AND CURING HAY.

From the Farmers' Cabinet.

Mr. Editor—The season has now arrived when the farmer will be required to cut and put away his crops of grain and hay; his fields are to be unladen of their treasures, and his barns to receive the rich stores which a kind Providence has given in return for his labor and skill, and it is to be hoped that his toil and care will be rewarded with an ample harvest. As some notions have suggested themselves to me in relation to the making and curing of hay, and as this is the season when they can be made useful, and I have experienced the advantage of their application, I have determined to give them publicity.

In making hay, I have for several years made it a rule not to spread the grass (except when it is quite ripe) upon the day on which it was mown. In cutting, I found the buts of the grass were generally thrown by the scythe so as to be exposed to the air, and the tops were below or covered by the buts or thicker part of the stems; I therefore let it lie until the next day, in order to dry the buts as much as possible before spreading. I then have it carefully turned from the bottom, and spread after the dew is off and the swarth has become well heated from the action of the morning sun. If the weather is unfavorable, the grass is allowed to remain in the swarth, and the tops being still covered and entirely green, the swarth will remain exposed to bad weather for several days without taking damage. I therefore continue to cut in cloudy or even rainy weather, and frequently have a large quantity ready to spread when the weather is favorable. I cut when it rains, and make hay when the sun shines. When the stems of the grass are well wilted and warm from the action of the sun, the tops on being exposed will soon dry—much sooner, as you may suppose, than when the whole is in a green state,

in which case, in order to dry the whole mass, it must be subjected to frequent turnings. After spreading, I turn once in the morning, and in the afternoon throw the hay into wind-rows with forks, turning at the same time, and clean up between them with the horse-rake, with which I also clean up after the wagons. I prefer this plan of gathering the hay into wind-rows exclusively with the horse-rake, because it leaves the hay in a looser state for the wind to circulate through it, and is more easily handled when put into heaps or pitched upon the wagons. On the afternoon of the second, or the morning of the third day after cutting, if the weather is fair, my hay is usually fit to be hauled in. In mowing away my hay, I have it kept level, well trodden and well salted. Salt subserves several useful purposes: it prevents the hay from moulding; the hay need not come in so dry from the field as it is required to be when salt is not used. It retains a better color, and more of the fragrant and delightful aromatic odor, after being thus cured, and is a much more wholesome food for horses and cattle; besides, *I think it adds much to the fructifying principle of the manure.* As a proof of its value for the food of horses, I will state, that two of my horses died suddenly of colic: I thought they had been killed by botts, but upon a careful examination of their intestines, I could not discover a single bott or other worm, and I attributed this to the fact, that they had been constantly fed with salted hay—I have never had a horse to complain of botts since I have used it; and I do not doubt that the general health of my horses and cattle has been much promoted by the generous use of salt amongst them, and that their food is rendered much more pleasant to them by a moderate admixture of it.

In pursuing the method of curing hay which I have above recommended, I have not only saved much labor, but retained and secured all the valuable properties of my hay. As a proof of the superiority of my method, I will state, that a large proportion of my crop has been annually sold in the Philadelphia market for years past. My hay would always find a ready purchaser, no matter how much was in market, and I was always able to obtain for it the highest market price. K.

P. S. No liquor allowed in the field or the barn.

JOURNAL OF A RECENT VISIT TO THE PRINCIPAL VINEYARDS OF SPAIN AND FRANCE.

(Concluded from page 444.)

Friday, 11th November.—On paying a small fee to the health officer, I was permitted, under his guardianship, to walk to one of the neighboring hills. The soil consisted of nothing else than the rough *debris* of the granite of which they are composed. Towards the bottom of the hills the vines were planted in double rows, three feet apart, with a space between of thrice that width, which had just been ploughed for a grain crop. Higher up, the ground is entirely covered with vines and olives, planted with regularity wherever the ground permits; but on ascending higher, advantage has been taken of every spot where it was possible to thrust a plant among the rocks. These vines have been planted with great labor, as there is scarcely soil enough to cover their roots; and terraces have been formed by small walls of dry stone, to prevent the little there is from being washed away. The vines were all pruned down to one or two knots on each mother branch, and each vine had from three to six or seven shoots, in proportion to their strength. Those among the rocks were in general very stinted, and must bear a very small crop. The olives, which they were now employed in gathering, were a small black variety, and I could not observe that they had suffered in the same manner as the olives of Andalusia.

Monday, 14th November.—Having yesterday been permitted to land, I spent last night in the posada at Rosas, and proceeded this morning to Figueras, in order to join the diligence which passes to-morrow morning for Perpignan. This country though far from being naturally so rich, is in a much higher state of cultivation, and proportionally more productive than the south. Passing through the town I observed them carrying out from a cellar the refuse of a fermenting vat, and on entering I found they had just been pressing the skins which had fermented with the wine. Outside the cellar were two presses, each on wheels. These were composed of a box 2½ feet long, and about the same width and depth, formed by light bars, with stronger bars at the corners. Before and behind these boxes was a screw, and there was a spout to convey to a vessel placed below, the *must* which would flow through the bars to the bottom on the pressure being applied. It was evident that these were *itinerant* presses, which the proprietor was accustomed to send to the different vineyards as they were required. I found also that he had a more powerful press within the cellar, and that there also was a mill for grinding olives, much superior to the one I had seen at the Marquis del Arco Hermoso's. The *basin* of the mill consisted of an immense piece of granite, formed into a circle, and hollowed out in a sloping direction, leaving a space level at the bottom considerably greater than was required for the vertical stone to turn upon, as upon a pivot; and attached to the vertical stone was a sort of scoop which collected the scattered olives into the line which it passed over.

Tuesday, 15th November.—This morning at 9 o'clock I took my seat in the *coupé* of the diligence, for Perpignan. I found here an Englishman who was returning from an excursion to Madrid and Barcelona. The road passed through a valley in the direction of the Pyrenees, the soil every where cultivated like a garden. Here were immense numbers of olive trees of a very large size, underneath which grain crops are cultivated. Some of the wheat has almost covered the ground; but in general it is just making its appearance, and in many places the plough is still at work. On the hills the vines are cultivated in terraces, and not a spot is left unoccupied. Adjoining the road over the Pyrenees are every where to be seen the marks of the greatest industry; not a spot which is capable of cultivation is left untouched, and the mountain scenery is sometimes beautifully diversified by dwellings surrounded with trees of every kind, and enlivened by the verdure with which the mountain stream has covered its banks. The hills themselves are entirely destitute of herbage. After passing the town of La Jonquiere on the French side, the ground (although evidently of

a very meager quality) appeared generally cultivated with vines and corn. The vines appeared every where to be cultivated with great care. I remarked some new plantations; and, in one instance, a plantation of the preceding year had made so little progress, that I could scarcely persuade myself the vines were not the cuttings of the present year newly planted, with some of the leaves still remaining upon them. On questioning the postilion as to this point, he said that the plantation *had two years*, but the ground here was so very arid the vines made little progress.

Wednesday, 16th November.—Having called at the banking house of Messrs. Durand, who are agents for Herries, Farquhar and Co.'s notes, I took occasion to mention to one of these gentlemen the object with which I was travelling, and to ask his advice as to the best mode of seeing the vineyards near Perpignan. He said I could not have inquired of persons more competent to give me information; that they had considerable agricultural establishments in the neighborhood, and if I and my friend (the gentleman with whom I had travelled from Figueras) would accompany them the next day, they would be glad to give us every information in their power. After accepting this very liberal offer, with due expressions of thankfulness, I mentioned that I had heard of their eminence as agriculturists, and had I gone to Marseilles in the first instance, I intended to have procured an introduction to them. He replied that it was unnecessary; that if we were agriculturists we were their friends—that all agriculturists were their friends. It was accordingly arranged that we should accompany them the next morning in their carriage.

Thursday, 17th November.—Mr. Durand having recommended our starting at six in the morning; as the days were short, and we had more than one place to visit, we proceeded to their house at daybreak. Both the brothers accompanied us. When we got clear of the walls of Perpignan, it was sufficiently light to enable us to make some observations as we passed. The olive is cultivated to a great extent on all sides. Mr. Durand knows only one variety, a large black sort, not so large as the La Reyna of Seville, but about as large as the largest of the other sorts cultivated there. Here, as elsewhere, the olive has this season been attacked by a worm, but it is attributed rather to a deficiency than an excess of rain.

The rain has this season been below the average in this district, and the country has suffered a good deal in consequence. The average annual produce of olive trees throughout the country is from fifteen to twenty pounds of oil; but there is every possible variety. A very fine olive, in a favorable year, will sometimes yield as much as 80 pounds. Such a misfortune as has happened this season is of rare occurrence. In planting they take a sucker from the root of an old tree, and keep it three years in a nursery; it is then transplanted, and in three years more it begins to give a few olives. In ten years it has become a largish tree, but requires many more years before it acquires all the magnitude it is capable of reaching. Many of the olives we passed had the greatest possible appearance of old age. They were so old, Mr. Durand said, that no one had any knowledge of their age. In general the ground underneath was cultivated with grain crops; the trees are benefited by the manure, and the crop suffers only partially from the shade. We saw, however, some very fine trees planted from thirty to thirty-five feet apart, which overshadowed the ground so much, that grain crops could not be cultivated under them with advantage.

After a drive of about an hour and a quarter, we arrived at the first of Messrs. Durand's establishments. This is an immense square enclosure, with high walls and buildings. It formerly belonged to the Knights Templars. The church is converted to a wine cellar, and the houses of the Templars to the residences of Messrs. Durand's peasants. Several other buildings are also erected within the walls, forming altogether a most complete and extensive homestead. After taking chocolate, we proceeeded to the vineyards. Mr. Durand only cultivates three varieties of vines, the Grenache, which gives sweetness, the Carignan, which gives color, and the Mataro, which gives quantity. His vines are in general planted either on the plain, or on a gently inclined slope; but when there is a slope, the exposure is always to the south. The soil is loose and stony, the stones *quartz*, of various colors and shades.

The stony and least fertile portions of the estate are selected for vines. Some of the cornfields are planted at wide intervals with olive trees, but there are none of these among the vines. The distance at which the vines are planted is always four feet, and the *quincunx* is preserved with the greatest possible exactness. The ground is ploughed twice a year; that is, immediately after the pruning, which is now going on, and in spring, after the vines have given shoots of 8 or ten inches in length. On both occasions, it is first ploughed in one direction and then cross ploughed. It receives no other labors during the year, and in summer, such is the strength of vegetation generally among the vines, that few weeds make their appearance, the ground being almost covered with the vine shoots. I was much surprised on finding that, with the exception of one field, the only preparation the ground had received previous to having been planted was a common ploughing. The cuttings were then put down in holes made by an iron bar or dibble, and left to shift for themselves. Many of them, as might be expected under such treatment, never came forward, and it requires six years before the vineyard is so well established as to yield a crop.

On learning this I had no difficulty in accounting for the small progress of the vines I had seen before arriving at Perpignan. There was a plantation of the Muscat of Frontignan, which was now six years old, but in much greater vigor, and with a much greater number of shoots on the vines than was usual. Having remarked this, Mr. Durand informed me that, in planting this field, he had caused a hole to be dug for each plant 18 inches deep by 18 inches long, and 12 wide, and had laid the cuttings horizontally into this trench, bending up the extremity where the plant was to grow. This, he said, accounted for the greater number of shoots from the greater quantity of roots. The produce, he said, was double what the ordinary vineyards yielded. The stocks are all extremely low, not more in general than six inches from the ground; but so well has the pruning been managed, that all the shoots are nearly vertical; stakes or props are thus quite unnecessary,

and are never used. Indeed, their use seems to be quite unknown throughout this district. The number of the buds or knots left in pruning was from three to six, according to the strength of the plant. They are universally pruned in the spur fashion. Having mentioned the system of alternate long and spur shoots, Mr. Durand's steward, who seemed to be a respectable and well-informed man, said that it would sooner wear out the plants. I told him of the precaution Mr. Domecq, of Xeres, intended to adopt in order to prevent the attacks of worms. He said that, however close the branch might be pruned, there was no danger of these worms finding their way to the heart of the stock, unless the stock itself were bruised or broken. It was, he said, by wounds or splits in the stock itself that the worms found access to it, and not by close pruning of the new wood. In this opinion I perfectly coincide with him. There are no worms in any of their vines, which are, indeed, all in the highest possible order.

The average produce of these vines is six barriques (hogsheads) per hectare; this is about 140 gallons per English acre; a much smaller produce than I would have expected from the general health and vigor of the vines, although it still continues a matter of surprise that they should produce at all considering the great hardness of the subsoil, and the slight hold of it which is originally given them. Part of the vineyard had already been pruned, and two men were busy in a part which we visited. There had been fourteen men employed the day before; but this was the *fête* day of the neighboring village, and only two of the men had come. It requires a man ten days to prune a hectare. The instrument which they use is contrived to give, in some degree, the purchase of a lever.

With the edge they cut with great care the shoots where a bud is left for the following season; but the superfluous shoots are chopped off with the blunt edge with very little ceremony. I took this opportunity to request that Mr. Durand would give me a parcel of cuttings of all the kinds of vines he possessed; and he immediately gave orders to his steward accordingly.

Between twelve and one o'clock we returned to the house, and after a substantial *déjeuner à la fourchette*, visited the wine cellar. Along the wall, on each side of the cellar, are arranged a number of large vats, containing from thirty to fifty barriques—that is, from 1800 to 3000 gallons each; the whole number was fourteen or sixteen. They were placed horizontally, with one end to the wall. Above them, on each side, is a floor or platform, which is on a level with a door that opens to the cellar from a higher side; by this door the grapes are brought in. On the platform are several troughs, about 10 feet long, by 2½ feet wide, with the side sloping inwards. Above the bottom of the trough there is a false bottom, perforated with holes, and divided by open spaces, which allow the liquid to pass to the true bottom, whence it flows, by a spout at the one end, into an aperture of about a foot square in the upper side of the vat underneath. While the men are treading the grapes in these troughs, they take out a portion of the stalks by means of a three-pronged stick, and after the grapes are pretty well broken, the whole contents of the trough are emptied into the vat. In the vat it is left to ferment, from 18 to 24 days, according to circumstances, and at the end of that period, the wine is drawn off to another vat, by means of a syphon and a pump. The *marc*, or skins and grounds, are then removed to the press, and the wine extracted from them is kept apart as being of inferior quality. In the end of each vat there is an aperture sufficiently large for a man to enter and clean it out. This is strongly secured by means of copper screws. After having been removed to a clean vat, the wine is kept in it till the following spring, when it is again drawn off the lees. When twelve months old, it is sent to Port Vendre, where Mr. Durand has very extensive stores and cellars; it is there mixed with 10 per cent. of brandy, and shipped for Paris. This is the ordinary description of Rousillon* wine, *of the plain;* but being made with more care than that of the smaller proprietors, it is the best of its kind. The wine of the hills is of a better quality.

Exclusive of the ploughing, which is done by their permanent servants, the management of the vines costs about thirty francs a hectare. The ploughing and the vintage may cost fifteen francs more—being, in all, about 16*s*. English an acre. The value of the produce is from 15 to 18 francs a *charge* of 26 English gallons; or from 180 to 216 francs per hectare—that is, from £3 4*s*. to £4 16*s*. per English acre.

After having walked into the garden, which was well stocked with fruit trees, we proceeded to the other property which Messrs. Durand proposed we should visit. This was entirely an irrigated farm. It consists of 240 hectares, 562 acres, and every acre of it can be laid under water when irrigation is required. This farm supports between 1,000 and 1,100 sheep, 114 head of cattle, and about a dozen horses, and there is always less than two-fifths of the land in pasture or green crops; the lucerne is cut five times in the season, and twice eaten down. The soil is a fine friable mould. In a field, where five ploughs were at work, it turned up in the finest possible condition. They were ploughing *in* wheat. Part of the field was manured, and part had been manured the preceding season. Messrs. Durand have an excellent breed of cattle; the working oxen as fine almost as any I have ever seen, although I have seen larger. In all the qualifications of depth and breadth of carcass, they were nearly perfect, with the line of the back perfectly straight, and the tail well set on. They were yoked with bows and yokes, the bows made of wood, which seemed to answer very well. The ploughs and carts were of the same construction as those generally in use in the country. The ploughman drove his pair of oxen with a goad fixed to the end of a long pole; on the other end of which was the small spade for cleaning the plough. They seemed to make excellent work, notwithstanding the rudeness of the plough.

The buildings on this farm were very extensive, and, though old, are now undergoing a thorough repair, which will leave them in excellent condition when completed. The stables and sheep houses are very spacious, as both cattle and sheep are housed every night. The lambs are always kept in the house, and the ewes are brought home

* Rousillon is the old name of the province which is now called Pyrenees Orientales.

to them three times a day. The lambs appeared all of the same size, and must all have been dropped within two or three days of each other. The wool was not of a quality that would be reckoned fine in New South Wales; and yet Mr. Durand says there is nothing finer in this part of the country. At the rate wools were selling in August this year, (1831,) it would bring, in London, about 18*d*. a pound. It is at present only worth about 7½*d*. here, though two years ago it sold for 20*d*. A good wether will bring 10*s*. or 12*s*. They do not milk the cows, but allow the calves to suck them. There is no such thing known in this country as a dairy farm. Oil is the almost universal substitute for every purpose to which butter is applied with us, and milk is seldom or never used. There are, perhaps, few prejudices stronger than that of the English against the general use of oil, which they are accustomed to consider as a very gross kind of condiment; and perhaps there is no prejudice more unfounded. For surely the pure vegetable juice of the olive is far from being inferior, in delicacy, to butter, the animal fat of the cow; and there can be no doubt, that oil is also more wholesome and congenial to the human constitution, in a hot climate, than the latter. This district is not celebrated for the quality of its oil; but they do not as in Spain, consider rancidity a merit; and in the hotels it is furnished of very good quality, while the olives are quite delicious. Mr. Durand's working oxen are fed during the winter on hay of excellent quality, and are all in the highest condition. They have also potatoes, and sometimes turnips in winter. One set is worked from morning till noon, another set from noon till evening. I neglected to inquire what the average produce of wheat is on this farm; but on the farm first visited, where there was no irrigation, it was sixteen or seventeen bushels per English acre. The workmen are paid extremely well. The permanent servants of the farm have 150 francs, ($28,) about £6 a year in money; 6 hectolitres (21½ English bushels) of wheat; 500 litres (120 gallons) of wine; 40 pounds of oil, and 20 pounds of salt, besides a piece of ground to plant vegetables and *haricots*, (the great dependence of the working people here,) and house room about the premises. The peasants and their wives and children are all extremely well clothed. Day laborers, at all seasons, receive 30 sous, about 14*d*. a day. In the harvest, mowers and sheep shearers, 2½ francs, and reapers two francs per day, besides their food; and Mr. Durand says, they make six meals a day at that time, and the quantity of food is almost incredible. About sunset we reached Perpignan, from which the last farm was three leagues distant, highly gratified with our excursion, and the kindness of our entertainers, who, to wind up their attentions for the day, had invited us to dine, and we now found a sumptuous dinner waiting our arrival.

Friday, 18*th*.—Messrs. Durand had been kind enough to say that they would give me a letter to their manager at Port Vendre, where they have a large establishment for shipping wines. I waited upon them to-day, and found it ready. Port Vendre is only about half a league from Collioure, which I had resolved to visit, as its environs produce the first quality of Rousillon red wine. At two o'clock I accordingly took my place in the diligence, and arrived at about seven at Collioure, where I stopped for the night. From Perpignan in this direction (southeast) the soil is richer than I have elsewhere observed it in the neighborhood of Perpignan. Though there is here and there a vineyard, the land is generally under corn or meadow. Two or three miles before reaching Collioure the country begins to ascend towards the Pyrenees, on the tops of which, bordering the ocean, are still to be seen some towers built by the Moors when masters of this part of the country. No sooner do the hills begin to rise, than the cultivation of the vine begins also, and the first ranges of the mountains are covered with it to their very tops.

Saturday, 19*th*.—After breakfast this morning I walked over to Port Vendre, and waited upon Mr. Mas, the agent of Messrs. Durand. The road from Collioure winds from hill to hill along the shore. The hills are exactly similar in form and structure to those of Malaga: a shale or schist, with a slaty gravel, plentifully mixed through the soil. Mr. Mas conducted me over the hills in the neighborhood of the town, which are planted with great regularity and beauty in terraces from 6 to 18 feet wide, according to the slope of the hill. The terraces are made to follow the different curves taken by the hills, and are divided by channels, to allow of the passage of the water. It is a stated part of the labor to carry up the soil from the lower part of the terrace, where it has been stopped by the small stone walls, to the higher part.

In planting these hills they break up the ground only to the depth of eight or nine inches, and as they take up a great number of stones, the depth of the soil remaining is not more than six inches. They then bore a hole in the loose rock with a bar of iron, and thrust in the plant to the depth of 12 or 15 inches. I saw a plantation of the preceding year where almost every plant had succeeded, although none of them had given shoots of more than six or eight inches. Mr. Mas says it was formerly the practice in this country to trench and break up the rock to the depth of two or three feet, but (strange to say) they found the vines were sooner worn out, and they now follow the less expensive method. A *hectare* of middle-aged vines is here worth 1,000 francs. The greatest expense is in the first plantation, for it is universally necessary to build a series of terraces to support the soil. The value of a hectare with a good exposure, before planting, is 500 francs. There is, however, little ground in this neighborhood remaining to be planted, although the greatest portion has been brought into cultivation within the last 15 or 20 years. The average produce, according to Mr. Mas, does not exceed six charges the hectare, which is just the half of the vines of the plain. The annual expense of cultivation, including the vintage, is 40 francs, but the wine is worth 28 to 30 francs a charge, or from 168 to 180 francs the hectare. The distance of the plants is from three to four feet, and the pruning is, in every respect, similar to that of the vines of the plain. The varieties chiefly cultivated are the Grenache and the Carignan. The vines are never manured. The wines sometimes remain in the fermenting vat so long as 30 days. Like the wine of the plain, it is seldom drunk in its pure state, but is sent to Paris, with an addition of from 7½ to 10 per cent. of brandy, in order to be mixed with the lighter wines

of Burgundy and Orleans, to give them strength and color. The mixture of the brandy has, they say, a double purpose. It enables them to ship the wines when 14 or 15 months old, without risk of their turning sour, which could not be done for twelve months more without the admixture; and it enables the Parisians to mix a portion of water in order to reduce the wine in strength, and thus to save a part of the municipal duty which is levied on wines entering Paris. The latter is, I think, the only valid argument. Being desirous of procuring some of the wine of Collioure, Mr. Mas sent a person with me whom he was accustomed to employ in such matters, and after completing my purchase, I went with the proprietor to the vineyard where it was produced, and obtained four varieties of grapes which were not in Mr. Durand's vineyards. This vineyard was on the side of a very steep hill, and appeared to have been planted with great labor; the terraces did not exceed from eight to ten feet in width, and the walls were from two to three feet in height. He said the annual average from 500 plants was about two charges of wine. This, according to the distance they were planted, was rather more than double the quantity stated by Mr. Mas; but it was probably only a guess, although I am inclined to think the estimate of the latter was under the truth. There was, however, no way of coming nearer the true state of the case, for he knew neither the extent of the hectare, nor of the arpent. The wine of Cosperon, which is celebrated as a *vin de liqueur*, is the produce of a farm which was pointed out to me by Mr. Mas, under one of the hills which we passed over. It is, according to his account, nothing more than a mixture of brandy with the unfermented juice of the grape. After the grapes (of the Grenache kind) are very ripe, they are gathered and allowed to dry a few days in the sun; they are then pressed, and the juice is put into a cask, where it is mixed with a large portion, Mr. Mas thinks from a third to a half of its own bulk, of brandy. The brandy prevents the fermentation, the liquor retains the sweetness and flavor of the fruit; and this is the *vin de liqueur* of Cosperon, which has acquired a great name in the south of France.

Monday, 21st November.—Having returned early yesterday morning from Collioure to Perpignan, I found the Messrs. Durand had sent to my hotel nine bundles, containing fifty each, of nine distinct varieties of vines, and on visiting them at their house, I was again pressed to dine with them, but on this occasion excused myself. The kindness and attention of these gentlemen to me, a perfect stranger, without the slightest claim to their notice, is worthy of remark. They are the sons of Mr. Durand, the deputy for the province, and are now managing his affairs in his absence. Their mercantile as well as their agricultural concerns are of great magnitude. The latter they informed me yielded only about 5 per cent. upon the money invested, but they make no allowance for the value of the improvements, which were very extensive. Besides the properties I visited with them, the one consisting of 700, and the other of 560 acres, they had two other estates in the neighborhood of Perpignan, and all in their own hands. The irrigated land is worth 1500 francs (about £60) per hectare, the vineyards not more in general than one-third of that sum; but that portion was, I believe, intended to represent the value of the land before planting. On one of the estates there is a handsome mansion, with extensive gardens, and a green-house. I was happy to promise that I would, in return for their attention to me, contribute to stock the latter by sending a packet of Botany Bay seeds, a present which I was glad to find would be highly agreeable to one of the brothers, who has a taste for horticulture and botany.

After having engaged my place in the diligence for Montpelier, (which was to start at seven in the evening,) I procured a guide, and proceeded to visit Rivesaltes, which is famous for producing the first sweet wine of France. Rivesaltes is a town containing about 3000 inhabitants, situated in the middle of an irrigated plain, about four miles from Perpignan. The vineyards are on the extremities of the plain, where there is a dry granitic soil; and on that portion which separates the meadow land of Perpignan from those of Rivesaltes, it is so thickly covered with stones of various colored quartz as to make it difficult to tread upon it. In many places where the vines appear to grow with great vigor, and to have attained a great age, the soil is of such a nature as would with us be considered absolutely sterile. They were very generally engaged in the vineyards in pruning and hoeing. The pruning was here, as elsewhere, universally in the spur fashion; from 3 to 7 or 8 knots being left on each vine, according to its strength. The stocks were in general close to the ground, and, indeed, where the soil was newly dug up, and gathered up into the form of a small ridge between the rows of plants, they scarcely seemed to be upon a level with it. I examined a plantation of young vines which had been planted last year, and found that more than one half the number had failed. Here also they never think of trenching the soil before planting; but after hoeing it the ordinary depth, they make a hole with an iron dibble and thrust in the plant. As they never afterward take the trouble to water them, it is not surprising that in so dry a soil so large a proportion of the cuttings should never take root. At Rivesaltes, for the first time in France, I observed them manuring their vines with strong stable dung, and I was informed that this was the usual practice here, although Messrs. Durand never used manure to their vines. The Muscat is the grape commonly cultivated, and by visiting different parties who were engaged in pruning, I obtained a few cuttings of this, and three other sorts; two of these four were entirely new to me; of two of them I had procured two or three cuttings each at Collioure.

The Muscat wine of Rivesaltes is made in the following manner: The grapes are allowed to hang upon the vines till they are so ripe that they begin to shrivel; they are then cut and left on the ground under the vines where they grew, for eight or ten days, unless the weather should prove unfavorable, after which they are pressed, and the juice is put into a cask, leaving the bung out; about a month after this, it is drawn off to a fresh cask, which is prepared by burning a match, not of sulphur, but of strong brown paper, steeped in the strongest brandy. They use this, they say, because the sulphur tastes the wine. The Muscat wine of Rivesaltes sometimes brings the proprietor 300 francs the charge of 118 litres (bottles) when

it is only from one to two years old. The produce of the vineyards of Rivesaltes was stated by the small proprietors, from whom I obtained the cuttings, to be about two charges for every 500 stocks, exactly the same as was stated by the person from whom I bought the wine at Collioure. I consider them both, however, as a very wide guess, for it was evident neither of them had been accustomed to reckon the produce in this way, and they neither knew the extent of the hectare, nor of the arpent. Many of the vines here seemed to require renewal, I would have been inclined to say owing to the quality of the soil, had I not seen the excellent condition in which Messrs. Durand's vines were kept, in soil which was in some places not less stony and arid.

In filling a vacant space, when they cannot find a shoot on any of the neighboring vines long enough to reach the spot, they take the longest shoot there is, and lay it in a circular form round its own stock; the following year they raise it, when, with the shoot it has produced, they cannot only reach the spot to be filled, but have by this means a strong plant to fill it.

While noting above the use of a match with brandy instead of sulphur, there has occurred to my memory an observation stated by Mr. Mas, in reply to my question, whether they did not find the burning of sulphur in the cask to taste the wine? He stated that when this occurred it must be owing to a small quantity of water having been left in the cask when cleaned. When this was the case, the wine, he said, was sure to be tasted, because the sulphuric acid impregnated the water; but when every drop of water was carefully drained off before the cask was smoked, it never occurred.

I returned to Perpignan about four o'clock, and began to ticket the different bundles of vines, taking only 25 of each of the varieties sent by Mr. Durand, on account of their great bulk. This, and other little matters which required arrangement, occupied me so fully, that I forgot to send for my passport till it was too late to procure it for the diligence that night.

Tuesday, 22nd November.—My delay for another day in Perpignan allowed me to visit the *Bergerie Royale*, where the government keep a flock of Merino sheep for the improvement of the flocks of the district. As Mr. Durand had assured me that it was not worth my attention, I had given up thoughts of visiting this establishment previously, but on now applying to my landlord for a horse, he told me that before arriving at the Bergerie, I would come to the Royal *Haras*, or depot of stallions for the south. At less than a league from Perpignan, I accordingly came to the house and offices which had been described to me as this depot, and on riding into the yard, I was conducted by a groom to the stable. There are here 31 horses, kept by the government for the purpose of improving the breed in this part of France. They are chiefly cross-bred, and I remarked several very beautiful animals which were a cross between the Arab and the Limousin. There was a small dark brown Arab from St. John d'Acre, and next to him a thorough-bred Arab, produced in France. The latter was incomparably the finer animal, in many points resembling old *Model*, of New South Wales, but I think inferior to him. There was also the *Jennet* of Andalusia, and a number of Flemish horses, both pure and crossed with various other breeds. The Russian and Polish breeds had also their representatives on this side of the stable. On the other side were the breeds of Normandy, and an immense animal from Mecklenburgh, for improving, as they said, the working breeds. Of this kind there were three huge horses, which appeared to me ill proportioned to such a degree as to be almost monstrous. Further on was a splendid English racer, though with more bone and muscle than the horses bred for the turf usually possess. This horse stood higher than any other horse in the collection; he is named *Rembrandt*, and was purchased by the French government from lord Seymour, at Paris, where he had distinguished himself upon the turf, and had been the winner of large sums. There was also an English horse of the little *Cob* breed, and between these stood some very fine saddle horses of the pure breed (I think) of Limousin. The charge made by the French government for the service of any of these horses is only six francs for each mare. They travel to the distance of from 30 to 40 leagues, and find their chief employment in the department of Arriege. Here there are few horses bred, the work being chiefly performed by oxen and mules, and the ass still maintaining its ground, though not to such an extent as beyond the Pyrenees. The services of each horse are limited to 45 mares; but notwithstanding the extreme cheapness of the charge, and the extensive district over which they travel, scarcely one of the horses covers this number during the season. The horses are fed at all seasons with meadow hay and ground barley. From the terrace behind the stables there is a rich view of the plain to the north of Perpignan, terminated on two sides by the Basses Pyrenees, and on the third by the sea. It is said that there is here an extent of land, 10 leagues in length by six in breadth, all of which can be regularly irrigated by means of small canals and water courses which are cut in every direction. The distribution of the water is regulated by law. The old chateau of Rousillon, with its round tower, overlooks this beautiful plain. The habitations are still, for the most part, congregated in small towns and villages, but here and there a detached house is to be seen. The plain is covered with trees, which border the water courses in every direction. Among these the Lombardy poplar, only now assuming the tints of autumn, is conspicuous. Every field is separated by a row of trees, chiefly the willow. These, however, on a nearer approach, lose much of their beauty, from the practice of cutting them down every third year for fuel, leaving only the trunk about 10 feet in height, with the stumps of the branches, to produce fresh shoots.

The plain of Perpignan offers as strong a contrast as possible to the (naturally) much richer plains of Andalusia. Much may be owing to the difference of climate, and the greater facilities for irrigation; but much more is owing to the difference in the political institutions of the respective countries. The absurd law of Spain, which prevents the enclosure of corn or meadow land, strikes at the root of all agricultural improvement.

On arriving at the bergerie, which is a shabby looking cluster of old houses in bad repair, I was informed that the sheep were out at pasture; and on following the directions given me, I soon came

up with them. There are 160 rams, and about 300 females. Their wool is certainly much finer than any I had seen at Mr. Durand's, but still there are few of our sheepholders in New South Wales, who could not show finer sheep in their flocks than the generality of them. The government make an annual sale of these sheep. The *minimum* price for the rams is 60, and for the ewes 40 francs. A very few of those offered sometimes go off at much higher prices, but the demand is not nearly sufficient to take off those that are disposable at the minimum price. I saw amongst them a Saxon ram, which had cost the government 600 francs. Running with the rams were a male and two females of the goats of Cashmere; the male was a very large animal, with long white hair; the females under the size of an ordinary goat, but they were both very young, the one being 18 and the other only 7 months old. They breed when under 12 months; the youngest of the two being expected to produce a kid in four months. After they are three years old, the shepherd said, (if I understood him right, which was no easy matter, from his Catalan dialect,) that they produce four kids annually. The fine Cashmere wool is produced under the hair, and is combed out in the month of May. The large male, they said, yielded from five to six ounces, and the females only two ounces a piece. The government, the shepherd informed me, possess 150 of these animals, which were formerly all here, but, with the exception of the three which I saw, they were removed to the interior. They were brought from Persia by a gentleman of Paris, who started with a flock of 1,600, only 150 of which he succeeded in bringing to France. They were purchased by the government at the price of 3,000 francs a head, and their produce were for some time offered for sale in this department, but found no purchasers. The price I either did not hear, or do not recollect.

Wednesday, 23*d*.--Last evening, at seven o'clock, I took my place in the diligence, the director having freely agreed to take me without any additional charge, and at seven this evening I arrived at Montpelier. In going into Beziers about nine o'clock this morning, I observed hoar-frost upon the grass where the sun's rays had not penetrated. The whole country from Beziers to Montpelier, on both sides of the road, is covered with vineyards. Between the former town and Penzenas the country is extremely beautiful even at this season. The hills are covered with olive trees, intermixed with vines but the plains with vines only. Detached habitations are every where thickly scattered over the country. The vine is cultivated even in the alluvial plains; and the immense size of some of the stocks, with the vigor of their numerous shoots, affords ample evidence that whatever may be the quality of its produce, the plant itself is no enemy to a rich soil. Notwithstanding the apparent richness of the soil, I observed them every where digging in large quantities of dung, and this, as well as the mode of pruning, indicated that they were more anxious for the quantity than the quality of the produce. The wines of this district are almost universally converted into brandy. The soil had the appearance of being calcareous the whole way from Beziers to Montpelier, in some places almost resembling the albarizas of Xeres, but on trial I found it argillaceous.

Notwithstanding the great luxuriance of the vines, and the strength and length of their shoots, still no supports nor props were used. Here and there I observed the shoots of three neighboring vines tied together to afford each other support; but even this practice was rare compared to the whole, which are allowed to spread as they will, and cover the ground in such profusion, as to make it in most places difficult to penetrate amongst them.

Thursday, 24*th*.—I this morning proceeded to the Botanic Garden, in the hope of finding some one who would give me information of the nature I required. My expectations were also a good deal excited by having heard from an Englishman whom I met at breakfast, that the professor of botany had there a collection of vines. I was not long in discovering this collection, which was numbered up to 560 varieties. I did not hesitate a moment to inquire for the professor, and to make known to him the object of my visit. He received me with great kindness, and asked many questions respecting the Australian settlements, in which he appeared to take a great deal of interest. He conducted me over the gardens, and through the conservatories, pointing out every object which he thought would interest me. The latter are very extensive, and in the most perfect order. Among other plants he made me remark the *Galactodendron*, the "tree of the cow, or milk tree," of Humboldt, which he said would undoubtedly grow in New South Wales. He also pointed out, growing in the open air, the *Caroubier* of Spain, the *Ceratonia Siliqua* of Linnæus, that yields a pod, upon which the mules are almost exclusively fed in the mountainous districts of Spain, and the south of Italy. This tree I had not so much as heard of. There was a small department separate for New South Wales plants, of which there was a considerable number. Finally, Professor Delisle told me, that I was not only welcome to cuttings of all the vines he had, but he offered me his correspondence for any thing he could in future supply. He also said he would make up a packet of seeds for our Botanic Garden. In return for such liberality, I did not hesitate to pledge myself to make him whatever returns our Botanic Garden could supply. He accordingly called for the catalogue of vines, which was partly printed, being a copy of the list of the *Ecole* of vines established in the gardens of the Luxemburg, at Paris, by Messrs. Chaptal and Bose, when the former was Minster of the Interior. A great proportion of the numbers which had been left blank in the original, were filled up in writing. He gave directions that a copy of the list should be prepared for me, and that a man should attend me to take cuttings of the vines. I determined to take a duplicate of each variety.

Saturday, 26*th November*.—Having ordered a quantity of leaden tickets to mark the cuttings, and a couple of cases to contain them, I proceeded to the garden yesterday morning, and found that the man had already commenced to take off the cuttings. On examining those he had taken, however, I immediately saw the necessity of making the choice for myself, and I have accordingly been engaged all yesterday and to-day in choosing the cuttings. This evening, by the assistance of a second man, who dressed the cuttings as they were taken off, we had finished this part of the task, and commenced attaching the numbers.

Monday, 28*th*.—This day, at an early hour, I proceeded to the garden, expecting to have all the vines numbered and packed before the evening. In this, however, I was disappointed. While the workmen were at dinner I spent an hour with the Professor, who showed me his Herbarium, which appeared to me very extensive. Among others, he opened out some New Holland plants, which had been collected by Laballardiere, the botanist, who had accompanied D'Entrecasteaux in his voyage. In reply to my inquiries respecting the history of the vines, the object to me of greatest interest, he informed me, that about 12 or 15 years ago, when Messrs. Chaptal and Bosc had formed the gardens of the Chartreuse, adjoining the gardens of the Luxemburg, into an experimental garden, specimens of the different varieties were also sent to the Botanic Garden of Montpelier, but many of these never succeeded. He told me that he had found it very difficult to obtain from the chief gardener at Paris the different varieties which he required to fill up the vacancies occasioned by those which had failed; they always sent *chasselas*, *chasselas*, *chasselas*, though under different names. A great part of the collection had therefore been brought together by the Professor himself. Mr. Delisle told me that there was a similar collection of vines at Versailles, and there was also one at Genoa.

All this day was employed in attaching the tickets to the vines, and arranging them in bundles, which, from many of them being very crooked, was no easy task. From the 560 varieties I could only make up 437, the remainder being either wanting in the original, or as identical with some previous number. I had also employed the master gardener to send a man on whose judgment and honesty he could depend, to make a collection of all the vines cultivated in the vineyards round Montpelier. This man had, all his lifetime, been employed in the vineyards; and as he gave me a description of the qualities of each, I had no doubt whatever that his collection might be depended upon. Rejecting, from those he brought me, such varieties as I had previously procured at Perpignan, I was now enabled to carry the collection of vines of Rousillon and Languedoc, or Pyrenees Orientales and Herault, to 38. I here again reduced the number of Mr. Durand's vines, taking only 12 of each of them, as well as of those cultivated in the neighborhood of Montpelier. When I came to pay for their carriage from Montpelier to Nismes, I had no reason to regret this reduction.

Wednesday, 30*th November*.—It was half past 10 this morning, when the packing of the vines was finished, and at 11 o'clock I started with them by the diligence for Nismes. Before leaving the garden, I paid a farewell visit to its liberal director, Mr. Delisle. I now received from him a letter addressed to Mr. Frazer, the colonial botanist, at Sydney, and also one for myself. In both he expressed his wish to maintain a correspondence with Sydney, to reciprocate the exchange of seeds and plants. He also gave me an introductory note to M. Audibert, the proprietor of a very extensive and celebrated nursery at Tarascon, a small town situated on the left bank of the Rhone, which he strongly recommended me to visit. A fourth paper contained hints about the best mode of preserving the cuttings from frost and damp; but on that subject he recommended me particularly to consult M. Audibert. Mr. Delisle had also waiting for me a packet of botanic seeds, which he had put up for the garden at Sydney; and a packet of seeds of the more useful trees, &c. for myself.

The Botanic Garden of Montpelier is only second in France to that of Paris. It appeared to me to be kept in very high order.

The weather has now become piercingly cold. On Friday and Saturday I found it very unpleasantly so in the garden, but on Sunday evening a strong wind set in from the north, and next day all Montpelier was wrapped in cloaks. The sloping glass roofs and windows of the conservatories were now all covered with straw mats, which were not rolled up till the sun had attained a considerable height.

The road from Montpelier to Nismes lies through a well cultivated country, producing chiefly vines and olives. The vines appear here to be cultivated for wine for the table more than for distillation. Their size and strength were less remarkable than on the other side of Montpelier; and although I saw several parties hoeing in the vineyards, I could nowhere observe them digging in manure. Here for the first time I saw the mixed cultivation of vines, olives, and corn, alternating in rows of different widths; and the vineyards are also very generally planted with olive trees. This seems to be the season for gathering the fruit of the latter. They place large ladders against the trees, and ascend to pull them, instead of beating them down with poles, as is the practice in Spain. The women are very generally employed in this way, and from all parts of the road are to be seen with small baskets slung round their necks, either perched upon a ladder, or mounted into the interior of the trees. Half way from Montpelier to Nismes lies the town of Lunel, which, with Frontigran, also in the same neighborhood, is famous for its sweet wines. These I did not, however, wait to visit, being now satisfied that whatever may be the case with regard to the quality of dry wines, it requires only a good grape, a hot sun, and a particular management, to make excellent sweet wines. A gentleman in the diligence informed me that the *Lunel* in only produced on one estate, but in this I think he was misinformed.

1*st December*.—The diligence for Tarascon not starting till half past eleven, I had time to visit many of the beautiful and highly interesting remains of Roman architecture which are to be found in Nismes. The cold, last night and this morning, has been excessive. I have seldom found any thing more keen and penetrating than the north wind out of doors, and the air of my chamber was almost intolerable till a large fire (for which the charge of two francs was made in my bill) had been some time burning. Even then, and with the assistance of a screen, it was still difficult to keep off the cold. The tiled floors are ill calculated for the winter, however suitable they may be for the summer temperature of these climates. In the morning the canal was frozen over, and there were pieces of ice of six cubic inches in thickness about the fountains.

I arrived at Tarascon about half past two o'clock, and having procured a guide, proceeded immediately to the nursery of the Messrs. Audibert, whom I found at home. The nursery is about a

mile and a half from the town. Messrs. Audibert expressed the greatest desire to be of service to me. One of the brothers conducted me through a great part of their nurseries, which are extensive, and apparently very well kept. He also insisted that I should remain for the night, and made up a packet of every variety of seeds which they could imagine would be useful in New South Wales. The elder brother, M. Urban Audibert, is a corresponding member of the Horticultural Society of London, and has, as M. Delisle informed me, a very extensive correspondence in all parts of Europe. His library is filled with books on all matters connected with rural economy and natural history, in all languages. I selected from their list of vines eight or ten varieties, which I either knew to be wanting in M. Delisle's collection, or conceived to be so valuable, that I was glad of the opportunity of making still surer of possessing them. These, being rooted plants, will afford the proof whether they or the cuttings are more capable of bearing the transport to New South Wales.

Having, according to the advice of M. Delisle, consulted Messrs. Audibert respecting the packing of the plants, he expressed his fear that without moss they would soon all die; for the north wind, he observed, caused dryness as much as the heat; his brother was accordingly kind enough to accompany me to the town, with a man who carried a bag of moss. The plants were unpacked, and the boxes lined with double oiled paper, to prevent the access of air, and the escape of humidity. The moss, after having been slightly watered, was stuffed in at the ends of each bundle of plants. The latter were then replaced, and the cases closed. This is the mode adopted by Messrs. Audibert in sending vine plants to Russia and other countries of Europe; and they were of opinion that this would be sufficient to protect the vines till their arrival within the tropics, when the warm weather would cause them to shoot, and it would therefore become desirable to sustain the shoots as little by the admixture of earth or sand among the cuttings.

Messrs. Audibert refused to receive any payment for the plants I had selected from their collection, although I insisted very strongly on paying the stated price, as well as for the time his workman was occupied. He furnished me with several copies of his catalogues; and as I had informed him there was an Agricultural and Horticultural Society in New South Wales, he expressed a strong desire to be put in communication with them. M. Audibert also furnished me with introductory letters to the Directors of the Botanic Garden, and of the Cabinet of Natural History at Marseilles.

I concluded these matters in time to join the diligence for Marseilles, which passed at half past two, having, by Mr. Audibert's advice, forwarded the cases containing the plants to Avignon, there to wait my return to that town.

I had several times endeavored, but without success, to ascertain the best mode of pickling or preserving olives. Mr. Audibert told me he had no doubt the innkeeper where I had left my baggage could inform me; and I took down from his dictation the directions, of which the following is a translation. The olives which he produced as preserved in this way were of an inferior kind, but appeared very well cured. "To make a lie, take for each pound of olives a pound of ashes and an ounce of lime; boil these ingredients in water till the lie is neither too thick, nor too clear.

"When the flesh of the olives detaches itself easily from the stone, which happens about six or seven hours after their immersion, the olives are washed with clear water, and left to steep for about nine days, the water being changed at least once every 24 hours. They are then kept in water, strongly charged with salt, and seasoned with a few grains of coriander seed, to give them a good taste."

This recipe was scarcely finished at the moment it was necessary to join the diligence, and I had not therefore time to read it, much less to ask such questions as are necessary to make it fully intelligible. The lie is doubtless intended to free the olives from the bitterness natural to them when fresh.

Saturday, 3d December.—At an early hour this morning I arrived at Marseilles. My object in coming to this city was to visit the districts in its neighborhood, where the raisins and other dried fruits of Provence are prepared.

I lost no time in waiting upon M. Negrel Ferand, the director of the Cabinet of Natural History whom I found not only very ready, but extremely well qualified, to give me the information I required. He said that almost the only district where raisins were made for exportation was Roquevaire, which was his native place, and to which he gave me a letter.

M. Negrel Ferand has contributed the division that treats upon agricultural and rural economy, to a quarto work now publishing in four volumes, on the Statistics of the Provence of Bouches du Rhone.

Being anxious to obtain the volume which treated upon this subject, he told me that I could not purchase it without the others, and that the whole work was not yet complete; but he very good naturedly gave me his own proof sheets. This work contains a detailed classification and botanical description of the vines cultivated in the department of Bouches du Rhone, or Provence, to the number of 74. The whole number which exists is stated to be about 350, but the above are all that are considered valuable for cultivation. The most of the others are cultivated in gardens and nurseries, more as an object of curiosity than usefulness. Of the 354 varieties, 220 have been perfectly identified with those bearing the same names in the collection of the Luxemburg.

In speaking of the olive, M. Negrel Ferand said, that its mode of bearing is biennial; that is, that the young wood must be two years old before it bears fruit. This accounts for the pruning every two years, and the frequent deficiency in the crop every second year. He said it was a point on which there existed much difference of opinion, whether it were better to prune the trees partially every year, and thus to have always a quantity of bearing wood, or to prune them fully every second year, and have a full crop once in two years. In this part of the country the olive is subject to great injuries from the severity of the weather; a great part of the trees in a whole district being occasionally cut off by the frost of a single night. The roots still remain, however, and are not long in sending up strong shoots; but the trees in this

part of the country never attain to any great magnitude. When the crop of olives is very small, they are generally attacked by insects. The annual average quantity oil produced from each tree is only about two quarts. The best oil for eating is extracted cold; what is extracted by warm water is used for burning, and for soap, and other manufactures. The oil of Marseilles is certainly more pure and beautiful than I have elsewhere seen it. The finest oil of France is produced at Aix, eight leagues north of Marseilles.

I walked with M. Negrel to the Botanic Garden, for the director of which I had also a letter. The garden is neither extensive, nor particularly well furnished. The conservatory is handsome, but is too large to be easily heated. The collection of plants is insignificant compared with that of Montpelier. I saw a swamp oak, a pretty large tree, and a splendid specimen of the caoutchouc, in the conservatory. A specimen of the latter in the open air had been killed by the frosts of the preceding week, notwithstanding its having been wrapped up with straw mats.

Monday, 5th December.—Having engaged a cabriolet and a guide from my *maitre d'hotel*, I proceeded at an early hour to Roquevaire; the distance is about 12 or 14 miles in an easterly direction. The road almost every where proceeded among steep acclivities, through a country which the industry of man has won from its original barrenness, and which is on all sides cultivated like a garden, with every variety of produce. The hills, or rather mountains, which bounded the horizon to the right, formed a very rugged and picturesque back-ground to this picture of industry. There is scarce a spot which, by any degree of labor, could be gained from the rocks, that is not under cultivation; and the same field frequently bears at the same time a triple crop; first is a triple or quadruple row of vines, then an open space from 6 to 12 feet wide, under corn or legumes; (and I could not but observe the garden pea several inches above the soil, and perfectly uninjured, notwithstanding the severity of the late frosts;) lastly, there is, with every third row of vines, a row of olives, and not unfrequently the whole is surrounded by a hedge of mulberries. The same system is pursued on the sides of hills so steep, that it is necessary at every 12 feet to have a wall three feet in height. Notwithstanding the natural ruggedness and poverty of this country, it appears to be every where teeming with a fine, healthy, and well fed population.

Between 11 and 12 o'clock I arrived at the house of M. Brest, the gentleman to whom, in the absence of the Mayor, M. Negrel had given me a letter. Besides being a proprietor of land, M. Brest is an extensive soap manufacturer and merchant; his premises are very extensive, and comprise a great variety of accommodation. In several of the rooms on the ground floor, women were employed in packing raisins into boxes and frails, similar in every respect to those used at Malaga, and the prices of the raisins appeared also to approach very near to those of that place.

The first quality is made from the *Panse* or *Passe*, a largish white grape, but by no means so large as some others. The skin is rather fine than hard; the bunches are sometimes very large, although M. Brest informed me, that they are reduced in drying to one-fourth of their original weight. The second quality is from the *Arignan*; the raisins of this grape are equally well flavored, and keep as well, but are smaller. When the former are thirty francs the quintal of 100 pounds, the latter are only from 20 to 25. The third quality consists of the smaller and loose grapes of the others, which are packed in frails; they are worth from 15 to 10 francs per quintal. The raisins of Roquevaire are packed in boxes, containing 12, 25, and 50 pounds, as at Malaga; but between every two inches in thickness of grapes they spread a sheet of white paper. These raisins, M. Brest says, keep the whole year through. They are certainly, in every respect, inferior to the raisins in Malaga. Their preparation invariably consists in immersion in a boiling lie previous to drying. They do not appear to be aware that it is possible to preserve the raisins without this previous preparation. M. Negrel says, the effect of the lie, in which they are kept from 15 to 20 seconds, is to open very fine cracks in the skin of the grapes, by which cracks the moisture evaporates. The strength of the lye is of the fifth degree of Beaume's hydrometer, which is equal in specific gravity, at the temperature of 55 of Fahrenheit, to about 1.032. After having been dipped in this lie the grapes are spread out on *claies*, which consist of a number of reeds tied together, so as to form a flat surface of about seven feet by four. They are brought under cover every night, and if the season is fine they are usually sufficiently dried in five days, though in the latter part of the season it sometimes requires fifteen days to dry them sufficiently. The preparation of raisins commences about the 25th of August, and continues during the whole of September, and sometimes as late as the 1st of November. Those raisins are finest which are dried in the shortest time. The neighborhood of Roquevaire is the only part of France where dried raisins are prepared as an article of commerce; in other parts they are cured by particular individuals for their own consumption. The *Panse Musqué*, or *Muscat of Alexandria*, is also found in this district; but although M. Negrel says it is the identical variety which yields the Muscatel raisins of Malaga, and though he strongly recommends it to cultivators in preference to the others, it is very seldom made into raisins. M. Brest says, the thickness of its skin makes it very difficult to dry it in this climate. M. Negrel also says, that the *Panse Musqué* is less cultivated than the *Panse*, because it is very delicate in flowering, and frequently blights. He says, however, that this may be remedied by pruning it long, and cultivating it in a trellis; the common *Panse* also requires to be pruned rather long. The whole quantity of raisins of the first quality produced for sale in Provence, does not, in the average of years, exceed 4,000 quintals, (400 000 pounds.) According to M. Brest the preparation of raisins is nearly on a par, as far as regards profit, with the making of wine. During the continental war, when it was impossible to import the raisins of Malaga and Calabria, those of *Provence* were in much greater demand, and their cultivation was much more profitable.

M. Brest had also a large quantity of figs packed in boxes, and ready for packing. The preparation of these consists simply in drying them on the *claies* for four or five days after they are pulled. The flat form which most of them have

is given them in the boxes, each fig being separately pressed into the box. The larger and smaller figs are packed in separate boxes, and the finest quality is double the price of the inferior. Nothing can be more simple than the drying and packing of figs. M. Negrel Ferand describes sixty-seven varieties of figs which are cultivated in the department of Bouches du Rhone. He quotes two authors, *De Solier* and *Raymond*, showing how much the cultivation of this fruit had fallen off within the last two centuries. The former, who wrote in the 16th century, after describing the means then pursued in drying them, adds, "that those of the inhabitants who had least, could sell from 100 to 150 quintals," (from 10,000 to 15,000 pounds.) "Two centuries later," the latter says, "the quantity of figs which the inhabitants dried formerly was their principal produce, but now each proprietor only gathers about 40 quintals, (4,000 pounds,) not more than enough for the consumption of his own family!"

The next object which attracted my attention was a quantity of large earthen jars, capable of containing from 40 to 60 gallons each. These were filled with capers of different sizes, from the size of a small nut to that of a very small pea, or, rather, to half the size of a very small pea. The latter are called *Nonpareils*, and are worth 32 sous (16*d.*) a pound. The former, being the coarsest quality, are worth only 3 sous a pound. Between these extremes there are 8 or 10 different qualities, all varying in price according to their size, the smaller being always the more valuable. They are put into vinegar as soon as they are gathered, after the different sizes are separated by means of a succession of coarser or finer sieves; and they need no other preparation. I observed a quantity of olives spread out upon some *claies* on the floor; they did not appear to have suffered in any degree from the worm, as was the case with most of the other olives I had seen. Many of them still retained a greenish, or, rather, a whitish color, while the majority were either of a deep purple color, or perfectly black. M. Brest said, these light-colored olives, pressed separately, would yield a finer oil than the others, though less in quantity.

From the apartments where the dried fruits were in process of packing, M. Brest conducted me through his soap manufactory, which is on a considerable scale, soap being one of the most important manufactures of Marseilles, and being made chiefly with the inferior kinds of olive oil; thence to a saw-mill, turned by water, and finally, to a room heated by steam for the treatment of silk worms. M. Brest next took me through the plantation adjoining his buildings, to show me how the caper is cultivated. At present the bushes are all covered with soil to prevent them being destroyed by the frost; and preparatory to this they had been pruned down to the length of from 6 to 12 inches each branch or shoot. In the spring they are cut down close to the stock, so that every year produces new branches. The bushes which yield the caper, if well treated, will last for 40 years. They yield on an average one pound and a half of capers, though some of the very strong bushes will occasionally yield from five to six pounds. The caper is the flower bud before its developement; the largest and least valuable grow near the bottom of the branch, the smallest at the top. They are gathered by women at the expense of a half penny a pound. The bushes are about four feet apart; they are propagated by means of offsets from the roots, two of which offsets were presented to me by M. Brest. On opening the box which contained these offsets in London, I had the mortification to find that they had both perished. Having expressed my desire to procure cuttings of the grapes which are dried for raisins, and of any other sort cultivated in the district which I had not already procured, M. Brest sent a boy to conduct me to a property of his own, with a message to the *fermier* to give me the different kinds I wanted. He observed that he would have accompanied me himself, had he not been very busy picking up a quantity of fruits which were required to be sent off immediately. The whole of the ground over which I went is cultivated like a garden. In many places the vines are only planted along the edges of the terraces, which are every where built to support the soil. The caper is very generally cultivated in this district. The *fermier* was not at home, but soon arrived. He gave me cuttings of six new varieties, a dozen of each. The vines are pruned, leaving on each shoot two buds, exclusive of the one at the junction. These are the vines which yield the grapes for drying; there were from two to three shoots on each vine pruned in this manner. The *fermier* said, that each vine produced from 8 to 12 bunches. According to M. Brest, the ground in this district is all trenched to the depth of 2½ or 3 feet before planting, but they do not put in the cutting the whole of this depth. M. Negrel states, that it has been observed that the roots come from the two buds nearest to the surface only, and that the lower part of the cutting imparts to the remainder a portion of its decay. There is a good deal of sweet wine made in this neighborhood, chiefly from a variety of the Muscat grape. The wines of *Provence*, or Bouches du Rhone, are not celebrated, nor do they appear to be known as well as they deserve to be. They have never furnished many choice wines for commerce; but M. Negrel says, many proprietors make them of excellent quality, when they take some trouble to have them good for their own consumption. I returned, after an excursion of an hour and a half, to the house of M. Brest, who pressed me to remain for the night, and return to Marseilles next day; but this kindness my anxiety to get forward induced me to decline; and, after partaking of some fruit and wine, I returned to Marseilles.

Tuesday, 6th December.—During the course of this day I visited M. Negrel. He is now engaged in removing the collections of Natural History to a new Museum. I was happy to be able to promise that I would send him from London a stuffed *Ornithorhynchus paradoxus* and a few shells. M. Negrel is only *pro tempore* director of the Cabinet of Natural History at Marseilles; Mr. Roux, who holds that appointment permanently, being at present travelling in the East Indies with a German naturalist. M. N. said it was probable they might visit New Holland, in which case he recommended them to my attentions. Through the kindness of Mr. Gower, an English merchant, to whom I had brought a letter of introduction, I procured letters to Valence, to the neighborhood of Beaune, and to Dijon; the first in order to enable me to visit, with advantage, the vineyards of Hermitage, the two latter, those of Burgundy. I then procured, for the purpose of planting in New South

Wales, a quantity of very fine fresh dates, three varieties; the first was called the date of Oran; the second, the Muscat date: both of these were from Tunis. The third was the common date of Barbary, to which they attach little value.

Wednesday, 7th December.—This morning, at seven o'clock, I quitted Marseilles for Avignon, where I arrived at eight in the evening. The whole district from Marseilles till within a few miles of Avignon, is, to all appearance, of the most sterile description, though every where cultivated with the greatest care. Aix, about 20 miles from Marseilles, is celebrated for the quality of its oils; but from this town, onwards, the olive becomes more rare, its place being taken, in general, by the mulberry. The plain round Avignon is said to be one of the richest in France. At Avignon I found that there is a regulated price at which the diligences are accustomed to take merchandise, much lower than they charge for the additional baggage of a passenger. I accordingly agreed for the carriage of the two cases of vine plants to Lyons.

Friday, 9th December, Valence.—Having joined the diligence for this place late on Thursday evening, I arrived about seven this evening, and immediately proceeded to the house of the merchant for whom I had brought a letter. I was informed that he was then from home, and it would be very late before he returned. I was, therefore, prevented joining a diligence which was to proceed to Tain at eight next morning. After quitting Avignon I saw no more olives, but the mulberry was most abundant on all sides; and every person with whom I have spoken on the subject, including Messrs. Durand, Professor Delisle, Messrs. Audibert, Negrel, and Brest, concur in representing the rearing of silk worms as a most profitable pursuit. M. Audibert said, that many persons in their neighborhood who had mulberries did not themselves rear the silk worm, but disposed of the leaves to others. The ordinary price given for the leaves of a good sized mulberrry tree was from seven to eight francs; and if the leaves happened to be scarce, so much as 10 or 12 francs have been given. They do not begin to strip the trees of their leaves till they are five or six years old.

Saturday, 10th December.—The gentleman to whom I brought the letter was not himself a proprietor of vineyards at Hermitage, but was requested to introduce me to some person having a vineyard there. On waiting upon him this morning, I found a letter prepared for me, addressed to Messrs. Richard and Sons, who are eminent wine merchants and bankers in *Tournon*, a town on the opposite side of the Rhone to *Tain*, and joined to it by a suspension bridge. On receiving this letter, I hired a vehicle to carry myself and my baggage to Tain, which is a small town, situated on the left bank of the Rhone, on the plain which lies immediately between the hill called *Hermitage* and the river. On presenting my letter, and explaining in general terms the object of my visit, I entered into conversation with Mr. Richard, senior, relative to the wines of Hermitage. The greatest part of the finest growth is sent to Bourdeaux to mix with the first growths of claret. Messrs. Richard are themselves proprietors of part of the hill of Hermitage, but not of that part which yields the finest wines. They are also wine merchants; but like the Messrs. Durand of Perpignan, they sell it only on the grand scale. One of the sons who manages this department, conducted me over the cellars. The press is more complete than any I have yet seen; the screw is of iron, and from the closeness of the worm, must be of immense power. It is raised in the centre of a square trough, about seven feet in diameter. The female screw is covered by a horizontal wooden wheel, the spokes of which project over the sides of the trough, and are finished off so as to afford a convenient handle for the workmen. At the height of a foot from the bottom of the trough, on the outside, there is a circular stage projecting from its sides for the workmen when filling the press, and turning the wheel. The sides of the trough only rise to the height of this stage. The grapes, without any previous treading, are built up in the trough to the height of the screw, and when the latter is turned, the *must* flows from spouts which issue from the bottom of the trough at each side. When the sides of the mass which may have been pressed out so far as to escape from the action of the press have been cut off with an instrument resembling a hay knife, and the press has been raised so as to receive this additional quantity, and again put in operation, the process is complete; not a drop of *must* remains in the *marc*, as the mass of skins and stalks is called. The *marc* is disposed of, and employed to produce a bad brandy; for this purpose it is soaked in water to extract any saccharine matter which may remain, and the fluid which it yields, when again pressed, is fermented and distilled. To my astonishment, M. Richard informed me, that by one charge of this press they could obtain 40 casks of wine, of about 50 gallons each. As the *must* flows from the press, it is conveyed to the casks, where it is suffered to ferment from five days to a month, according to the strength of fermentation, the casks being always kept full to permit the scum to escape. When the first fermentation is decidedly finished, the wine is drawn off into a clean cask, which has been previously sulphured. This is the whole process of making the white wines of Hermitage. They are more or less sweet, according to the proportions of sweet and dry grapes which have been united in producing them; for they are all made from two varieties, the *Marsan* yielding a *must*, which, by itself, would give a sweet wine, and the *Rousette* a *must*, which, by itself, would yield a dry wine.

The white wine of Hermitage, even after having undergone the complete fermentation above described, still retains a disposition to effervesce when put into bottle. It is said to be without question the finest white wine of France, and will keep for 100 years, improving as it gets older; and when very old, acquiring a similarity to the white wines of Spain.

For fermenting the red wines, Messrs. Richard have two vats each capable of containing 16,000 gallons. Every day, as the grapes are brought from the vineyard, they are trodden, in troughs, and then emptied into the vats; and while the vats are filling, a man gets into them once a day to tread down the surface. The object of this is to prevent the surface from becoming sour by exposure to the air, and to render the fermentation as equal as possible through the whole mass. When it becomes too deep for a man to tread it to the bottom, he suspends himself by the middle from a

plank across the vat. The duration of the fermentation is very uncertain, depending upon the state of the weather, and the ripeness of the grapes. Messrs. Richard ferment the finest grapes in one vat, and those of an inferior quality in the other. I tasted the wine of both vats of the last vintage; the first was made of the best grapes, which were also gathered in dry and warm weather; the second quality was made from the inferior grapes, and from others which had been gathering during rain and cold weather.

The fermentation of the first was over in five days, and its present value is 300 francs the cask of 210 litres, (that is, about as many bottles;) the other continued fermenting in the vat for twenty days, and its present value is only 80 francs for the same quantity.

The finest clarets of Bourdeaux are mixed with a portion of the finest red wine of Hermitage, and four fifths of the quantity of the latter which is produced are thus employed. The wines are racked off the lees in spring, and sulphured. A very small piece of sulphured match is burnt in the casks intended for the white wine; the red wine requires a greater portion. These matches are purchased from persons who make a business in preparing them. They are slips of paper, about one inch and a half broad, and when coated on both sides with sulphur, are about the thickness of a sixpence. A piece of one inch and a half square is sufficient for a cask of white wine containing 50 gallons.

On returning from visiting the cellar of old wines, which is under the other, I found one of M. Richard's sons in the office, who had been 12 months in England, and spoke English very correctly. He took me to visit one of the largest proprietors of the part of the hill of Hermitage, which produces the best wines. We found him at home, and walked with him to two of his vineyards. The hill of Hermitage is so called from an ancient hermitage the ruins of which are still in existence near its top. It was inhabited by hermits till within the last 100 years. The hill, though of considerable height, is not of great extent; the whole front which looks to the south may contain 300 acres, but of this, though the whole is under vines, the lower part is too rich to yield those of the best quality, and a part near the top is too cold to bring its produce to perfect maturity. Even of the middle region, the whole extent does not produce the finest wines. M. Machon, the gentleman whose property we were traversing, pointed out to me the direction in which a belt of calcareous soil crossed the ordinary granitic soil of the mountain, and he said it requires the grapes of these different soils to be mixed, in order to produce the finest quality of Hermitage. I took home a portion of the soil which he pointed out as calcareous, and the degree of effervescence which took place on my pouring vinegar upon it, indicated the presence of a considerable portion of lime. It is probably to this peculiarity that the wine of Hermitage owes its superiority; for to all appearance many of the neighboring hills on both sides of the Rhone present situations equally favorable, although the wine produced even upon the best of them never rises to above half the value of the former, and in general not to the fourth of their value. A good deal may also be attributable to the selection of plants. The best red wines of Hermitage are made exclusively from one variety, and the white wines from two varieties; but in the district generally a much greater number of varieties are cultivated. The red grape is named the Ciras.* The white varieties are the *Rousette* and the *Marsan*. The former yields by itself a dry and spirituous wine, which easily affects the head; the plant produces indifferently. The latter yields a sweeter wine. They are mixed together to produce the best white Hermitage.

The labor bestowed upon these vineyards is immense. According to M. Machon, on their first plantation, and every time the plantation is renewed, the soil is dug to the depth of $4\frac{1}{2}$ or 5 feet. In most places it is also supported by terraces. This was the first place, in the course of my journey, in which I observed any supports given to the vines; but these were simply a stake of about five feet in height to each plant, and the shoots were tied together at its top; for from the care indicated by the small trellis of the Medoc vineyards, this part of the labor seemed to be performed in the rudest possible manner. M. Machon informed me that the vines require constant attention to keep them in bearing, and whenever a vine is observed to be weak, or to yield a poor crop, it is dug out, and its place supplied by a *provin* from the strongest vine in its neighborhood. I saw this operation commenced and completed. A vine which appeared weaker than the rest was dug out, and a trench of about two or twc and a half feet deep was opened up between it and the nearest vine in the adjoining row. This vine bore three vigorous shoots; the stock was carefully bent down till it was laid flat along the bottom of the trench; a quantity of dung was next put over it, and then some soil; of the three shoots, the least favorable from its inclination was cut off, one of the two remaining was bent back to the original position of the stock, and there fixed by the covering in of the soil; the other, in like manner, was bent in the opposite direction to fill the place of the plant which was dug out. It was evident that this is a very different process from that of filling a vacant space by bending the shoot of an adjoining vine into the ground till it issues at the place where it is intended to grow, and afterwards, when it has acquired sufficient strength, cutting off its connexion with the original; the stock actually became the root of two distinct vines, and their connexion is never destroyed. This process had taken place with a considerable portion of the vines this season, and a portion of them are annually treated thus: Into each trench was put rather a large basket full of stable dung, mixed with soil. On my expressing great surprise that dung should be used at all in a vineyard of such reputation, as I had always understood, that though it added to the quantity of the wine, it injured its quality, and often gave it a bad flavor, the proprietor said, that without frequent and strong manuring the vines would scarcely yield any thing; and that provided horse or sheep dung only was used, there was no danger of its giving the wine

*In the *Œnologie Francaise*, a very minute and correct account of the French vineyards, published in 1826, the name of this grape is spelt Scyras; and it is stated that, according to the tradition of the neighborhood, the plant was originally brought from Shiraz in Persia, by one of the hermits of the mountain.

n bad flavor, though the contrary was the case if the dung of cows, and still more that of pigs, were made use of. M. Machon gave me 12 cuttings, the number I requested, of each of the three varieties of vines. He strictly charged the vigneron to select them from young vines; he said it was with the greatest difficulty they could get the vines to last 30 years, and they would not last more than half of that time, if they were not taken from young vines, that is, from vines of five or six years. The vines of Hermitage are planted at the distance of only 2½ feet from each other, and are pruned differently from any I have before observed. They are not anxious too keep the stocks low, as in the south, but many of the older among them are 18 inches, or two feet in height. In general there is only one mother branch, and one shoot only (very seldom two) is pruned to yield the shoots of the season; on this shoot are left from 3 to 8 buds, according to its strength, and from 8 to 10 bunches is the average produce of each vine. However loosely the bearing wood of the season appeared to be tied up in a tuft at the top of the stake, M. Machon showed me that the portion which had been left of the last year's wood was carefully bent down in a circular form, and thus fixed to the stake. This, he said, was to prevent the sap from shooting up with too great force to the top. The average produce of M. Machon's vineyards is from 10 to 12 casks, or about 500 gallons per hectare; that is, from 210 to 260 gallons per English acre. The soil appeared to be of great depth, and full of small stones and gravel, but still there was every where a large proportion of good vegetable mould. An observation made by M. Machon was, that the wines of granitic soils soon acquire their maturity, and were in general very pleasant wines for the consumption of the country where they grew, but seldom kept well.

Before parting, M. Richard asked me how I had in general been treated by his countrymen, and he appeared much gratified when I told him that the attentions I had uniformly met with far exceeded either what I did expect, or had any right to expect. Indeed, I have often reflected how ill placed was the reserve I was advised to use about the objects of my journey, when in the Bordeaux country in 1822. I was then told, that if these were known, it would excite the greatest jealously wherever I should go, and that I would be thwarted and misled in every possible way. On the present occasion I had no advisers; and acting upon the impulse of my own disposition, I uniformly prefaced my request for information with a statement of the object for which it was required. So far, however, from having been in any one instance ill received or misled, I have found every person to whom I applied anxious to forward my undertaking. M. Richard expressed a hope, that if I published an account of my journey, I would give his countrymen the credit to which I considered them entitled.

Wednesday, 14th December, Beaune.—After quitting the vineyards of Hermitage, there was nothing which I was desirous of examining, till my arrival in Burgundy, and I according made the best of my way to this town, which is in the centre of the *Cote d' Or*. Spending only one day in Lyons, which was still in a state of ferment from the disturbances that had taken place three weeks before, the road from *Chalons sur Saone*, whence I took my departure this morning, and Chagny, a small town, where commences the range of hills called *Cote d' Or*, was crowded with people driving cattle and pigs; a gentleman who was with me in the diligence said they were going to a fair at Chagny. I observed a number of very fine working oxen, in pairs; they were yoked by the head, and appeared perfectly docile. My companion said they were worth from 300 to 400 francs a pair. I had a letter of introduction addressed to Rully, near Beaune, and I never doubted that I should find it within a mile of that town. On making inquiry, however, in which direction I must proceed, I was informed that Rully was 13 or 14 miles distant, and that I had passed it by on the road from Chalons. After some hesitation, I resolved, as the weather was extremely wet, to content myself with seeing the vineyards nearer Dijon, to which town I had also a letter. After waiting a couple of hours in hopes of better weather, I procured a boy to conduct me in the direction of Pornard, the nearest vineyard to Beaune which has any celebrity. After leaving the town, however, for about half a mile, I became tired of walking through the mud, which was in many places ankle deep, and turned aside to join some men who were at work on the road side. The first thing which had struck me on seeing the vineyards of Burgundy, was the extreme closeness and feebleness of the plants. These men were employed in planting. They opened a small furrow with a spade, only one spit, or about 12 inches deep, and about 9 inches wide at the bottom. The furrows were 2½ feet apart, and the plants were placed in them at the distance of 14 or 15 inches; the lower end of the plant was placed across the bottom of the furrow, and bent up at one side; a quantity of dung was placed above, and then the soil was covered in, and the plantation finished. They told me that after these vines were three years old, the strongest of them would be selected to fill another row between each of the present row, by the system of *provignage*, the same as I had seen at Hermitage; and thus a space of 15 inches only would be left between each plant in every direction. The vines adjoining had not more space allowed, although the soil appeared exceedingly fertile. They said it would yield a good ordinary wine, but not a fine wine.

The plain between Cagny and Beaune, lying to the southeast of the range of hills, which, from the value of their produce, give the name of *Cote d' Or* to the department, is extremely rich, and to all appearance capable of yielding golden harvests of corn, as the hills do of wine. The greater portion of it, however, was planted with vines on both sides of the road. Near Cagny it appeared lighter, with a larger admixture of stones, and on approaching Beaune, it was a rich brown loam. A portion of the soil taken from where the men were planting was very slightly calcareous. Towards the top, the range of hills, which are of no great elevation, not nearly so high or so steep as Hermitage, was not planted, but seemed to be in a state of nature, or in pasturage. The hill of Hermitage was planted to the top.

Thursday, 15th December, Dijon.—Having joined the diligence at ten last night, I arrived here at three this morning. After breakfast I proceeded to the house of the merchants to whom I had

brought a letter from Marseilles, but found they were both from home; neither was there any person belonging to their establishment who could in any way forward my views. I applied to the innkeeper; and after telling him the object of my journey, inquired if he were acquainted with any of the proprietors of the best vineyards. He said yes; that he could give me the address of a proprietor at Gevray, and also of the proprietor of the Clos Vougeot. The day was, however, too far spent to proceed to either of these places. I therefore walked through the mud to the nearest vineyards, and entered into conversation with some of the people whom I found employed in them. The place I visited was a gentle slope, with a southeast exposure. The soil seemed good, and at the same time perfectly loose and full of gravel. It belonged to the mayor of the town, and produced, the man said, a fine wine; by which term the French characterize, generally, those wines which are drunk pure and in wine glasses, in contradistinction to those which are drunk in tumblers mixed with water at their ordinary meals. If, however, I had sought a reason for the wine not having a high name, I might perhaps have found it in the quantity of strong dung he was adding to the soil, and to the mixture of different kinds of vines, the *infamous gamé*, as it is sometimes called, holding a considerable place. He was busily employed in the *provignage*, which seem almost the only work going on at present. He had commenced the same morning, and had dug about twenty trenches, three or four feet long by about two feet wide. In each of these were half a dozen *provins;* that is, the ends of the shoots which belonged to the stock that had been buried in the trench. These trenches are never more than half filled, as the shoots are never sufficiently long to come up to the level of the surface. From this circumstance the whole of the vineyards of Burgundy are full of these holes at irregular distances, and have a rugged and unworkmanlike appearance. I remained while he completed two of these trenches, and he endeavored to explain to me the process; but all that I could comprehend was, that the shoots were so disposed as to preserve the alignment, although it would have been very difficult to point out which way the alignment lay. For this purpose the stocks and roots were twisted, and the different plants laid across each other in every possible direction. At a little further distance, another man was employed in rooting out a vineyard, which he said had been neglected some years before, and which it had been found impossible to reduce to order. The plants were literally crowded to such a degree, that it was almost impossible to set down the foot without treading upon some of them. Before it should be again planted with vines, it would, he said, be laid down for three or four years with sainfoin. This is a common preparation of the soil for vines in this district, and seems to be almost considered equivalent to a trenching. He said that, for a poor man, the *gamè*, or as it was generally called, the *large plant*, was undoubtedly the best kind of vine, the quantity it yielded was so much greater than the other; and, to a poor man, the quality was not so much an object, for the large proprietors and merchants would never acknowledge his wine to be a fine one, and it was very difficult to sell it for a high price, however good. He said that, in that soil, the large plant would yield eight pieces of wine on a plot of ground 78 paces by 24, (the extent of that he was working.) This is little more than the third of an acre, and is more than 1000 gallons per English acre. It would require, he said, to be occasionally manured. The manure gave a slight flavor to the wine for the first season only; but as only a part of the ground was manured each season, the bad flavor of the part was not observed in the whole. The soil of this vineyard effervesced very strongly with an acid.

Friday, 16th December.—Having engaged a cabriolet from the *maitre d'hotel*, I proceeded at an early hour this morning for Gevray and Clos Vougeot. It was a retracing of part of the road by which I had arrived from Beaune. The appearance of the range of hills is almost in every respect similar to what it was from Cagny to Beaune, but towards the top it was more generally covered with wood. On both sides of the road the soil also appears similar, but on the north side it is in most places evidently too moist for the vine, and is under cultivation with corn. The young wheat looks healthy and vigorous, but is not nearly so far advanced as in the south. The country is thickly peopled along the whole range of the Cote d'Or. There are said to be fifty villages between Dijon and Beaune, a distance of twenty-six miles. Some of the villages are of very considerable extent, and the houses are in general large, and all whitewashed and in good order.

The village of Gevray is about five miles from Dijon. In its immediate neighborhood is the small vineyard of Chambertin, as well as several others which yield wines scarcely inferior, though less known to fame.

The person to whom my guide was desired to take me, was a merchant as well as a proprietor. He said he would, with the greatest pleasure, give me all the information in his power, and he made some general remarks upon the requisites which must concur to afford a good wine. But he said that the postilion had informed him that he was also directed to take me to the Clos Vougeot, where I would find the confidential manager of M. Ouvrard, the proprietor, who could explain much better not only the management of the vineyard, but the making of the wine, for it was the largest and best managed vineyard in Burgundy. In the mean time, as I had expressed a desire to see Chambertin, he procured a vigneron, who, he said, was a very intelligent man, and would conduct me to it. Chambertin lay in the direction of Vougeot, but by a very bad road. The land under vines is in general very much subdivided throughout France, but here the properties are of less extent than any where I have been. Five or six proprietors often divide among them a piece of ground not exceeding an acre in extent, and the usual extent of most of the separate properties is not more than half an acre. The vigneron said that the wine produced to the left of the by-road we were travelling was inferior to that on the right, which was higher and drier. We turned off into the vineyard of Chambertin, which in extent cannot exceed 15 or 20 acres; but this, like most other parts of the district, is subdivided among a number of proprietors. The vignerons were at work on most of the divisions, which are only made by a footpath, or an irregularity in the

plantation. The soil of Chambertin varies extremely, even in the distance of 100 yards; that nearest the road is of a brown loam of sufficient consistency, but full of gravel, and consequently very friable. The gravel consists of small broken pieces of the whitish limestone, of which the hill is partly formed. At the highest limit to which the ground has been broken up, it is a light colored clayish looking soil, with a subsoil of marl, and abundance of small shells. Both of these soils effervesced strongly with an acid, but the light colored evidently contains a far greater proportion of lime. The soils of Beze, another first rate vineyard of the commune of Gevray, was exactly similar to that of the lower part of Chambertin. A league further on, the middle part of the Clos Vougeot was as nearly as possible the same; but the lowest part of that vineyard is almost a pure clay, of a dark yellow color, without any admixture of calcareous matter whatever. From what I had previously observed at Dijon on the one side, and Beaune on the other, I have no doubt that the same character applies, with trifling variations, to the whole range of the Cote d'Or. Nearest the top the soil contains a larger proportion of lime, and this in general yields the driest and best wine. On descending, the clay begins to predominate, and the wine gradually falls off in quality till it becomes the *vin ordinaire* of the country. By dint of frequent observations and repeated questions, I conceive that I at last perfectly understand the system of *provignage*. To make it plain, suppose a small portion of ground to be annually planted with vines. At the end of ten or a dozen years a number of the plants, in the portion first planted, become weak and worn out. These weak plants are removed, and their places filled by provins from their stronger neighbors; but these provins are not mere layers which leave the stock exactly as before. The whole space of ground, generally the breadth of two rows of plants, is dug out to the depth of about two feet; the old stock is then laid flat down in the bottom of the trench, and the branches, that is, the wood last produced, are twisted and bent into the places where the voids are to be filled. The stock is thus converted into the root of two or three different plants; it throws out fibres from every side, which henceforth yield the nourishment to the plants, and the old root dies off. I observed some spots where all the plants had been too weak, and a colony of young plants, as it was called, had been introduced, which would be employed in peopling their neighborhood when they had acquired sufficient strength. The *provignage* extends irregularly over the whole vineyard, but most, or all, of the plants are thus buried, and renewed once in 12 or 14 years; and thus the whole is in a constant state of bearing, (the provins yielding a crop the first year,) and it is seldom necessary to introduce young vines. All of the small proprietors manure their vines with strong stable dung; they make no distinction between that of horses and that of cows.

After quitting the vineyard of Chambertin, I rejoined the cabriolet, and after recovering the main road, proceeded to Clos Vougeot. This vineyard formerly belonged to a convent, and the buildings are therefore rather extensive. What was the old vineyard is enclosed by a high stone wall; but M. Ouvrard, the present proprietor, has also acquired a considerable portion of the land without the wall, and the present extent of the Clos Vougeot is therefore 48 hectares, 112½ English acres.

I mentioned to the steward of M. Ouvrard, my disappointment regarding my letters of introduction and my having resolved in consequence to trust to the good nature of the proprietor of Clos Vougeot for a friendly reception. He replied, very heartily, that I had done well. He conducted me over the cellars where the wines are made, and subsequently over those where they are kept, explaining the whole process pursued in making the wine, and answering all my questions with great exactness. The first cellar forms a square, or rather consists of four parallelograms, enclosing a square. In each of the four corners is a large square case, or trough, about 12 feet in diameter; and above this an immense lever, worked by a wooden screw, similar to those I had seen for pressing the olives in Spain. Along the walls, on each side, are arranged the fermenting vats, which are each of the capacity of 18 hogsheads. The vintage is, in general, soon over, M. Ouvrard employing often from 400 to 450 vintagers at the same time. For the red wine, the grapes as they are brought in are thrown into the large cases or troughs above described, and there trodden by a number of men, with large wooden shoes, till the grapes are nearly all broken. They are then taken up in baskets, with interstices wide enough to allow the grapes to pass through, when a portion of the stalks, generally about two thirds, are taken out. If the whole of the stalks were taken out, the quality of the wine, as has been repeatedly proved, would be inferior. The whole is then put into the vat into which the must, as it ran from the treading, had been previously carried. With the number of people employed, it requires a very short period to fill a vat. A space of about 12 inches is left unfilled at the top, and a sliding lid is then put over, which floats upon the surface. As soon as the fermentation becomes violent, the swelling of the mass lifts the lid to the height of six inches above the mouth of the vat. As, however, the skins and the stalks had previously risen to the surface, none of the liquor escapes. A very small space, formed by the looseness of the lid, is considered sufficient to allow the gas to escape, until the rising of the lid allows a greater space. And it is perhaps owing to the confinement of the gas that the lid is raised to such a height. If the weather had been very warm when the grapes were gathered, and still continues warm, while the fermentation is going forward, the wine is soon made. The fermentation is sometimes over in 30 hours; at other times it continues 10, 12, and even 15 days. The best wine is always produced from the most rapid fermentation. When the fermentation slackens, the liquor begins to subside, and when it is entirely over, sinks within the top of the vat, but not so low as when the vat was first filled; for the *marc*, or, in other words, the stalks and skins, are completely separated from the liquor, and float upon the top.

As soon as it is known, by the subsiding of the head, and by the taste and examination of the wine, that the fermentation has ceased, the wine is drawn off into large vats, which contain about 700 gallons each. Every three or four months it is pumped, by means of the syphon and bellows, into another vat of the same dimension, when a

man enters by the small opening left in the end of the vats, and washes out, with a brush and cold water, any lees which may have been deposited. The Burgundy of the Clos Vougeot receives no other preparation, and it is treated in this manner as often as may be judged requisite, till it is disposed of. They commence selling it when three and four years old, but the wine of very favorable seasons is retained by the proprietor till it is ten or a dozen years old, when it is bottled, and sold at the rate of six francs a bottle. The price of the wine of ordinary vintages, from three to four years old, is from 500 to 600 francs the hogshead, but seasons occasionally occur when the wine is not better than the *vin ordinaire* of the country. The wine of 1824 was given to the laborers as their ordinary drink; that of 1825 is now ripening in the large vats, and will be worth, in three or four years more, six francs a bottle. The wine has been found by experience to be of better quality, and to preserve its perfume better, in these large vats than in casks.

For making the white wine, the process here, as elsewhere, is different. The grapes are pressed without being trodden; the *must*, as it flows from the press, is conveyed to the small casks, where it is left to ferment, the casks being occasionally filled up to allow the scum to escape. The fermentation of the white wine lasts from 10 to 15, or even 20 days. At the end of three weeks, or a month, the white wine is drawn off the gross lees which it has deposited, into clean casks. In the spring it is again drawn off into sulphured casks. M. L'Ecrivain, M. Ouvrard's steward, knows the use of spirit of wine, instead of sulphur, but they use the latter from economical motives; the sulphur for a cask costs only a sous, the alcohol to produce the same effect would cost six sous. They do not find that the sulphur tastes the wine. They are getting rid of the white grapes in the Clos Vougeot, for the vines not only produce less, but the price of white wine never rises so high as the red wines. It is no uncommon thing for a hogshead of the latter to bring from 1,250 to 1,500 francs, but the white wine never rises above 600 francs the hogshead. The average produce of the Clos Vougeot, that is to say, the average of twenty years, is about 100 *qucues*, of two hogsheads each, or about eight hogsheads per hectare, something less than 3½ hogsheads per English acre. They never manure the vines, and they have no other varieties of the black grape than the *Pineau*, or of the white, than the *White Pineau*, and the *Chaudenay*, which resembles it so much that the two kinds are confounded. M. L'Ecrivain said, that if he knew of a plant of the *gamé* in the vineyard, he would have it immediately dug out. Every year they carry up a quantity of the strong soil from the bottom of the vineyard, which, as before observed, consists of a yellow clay, to mix with the lighter soil of the higher part. They also mix the wine produced on the higher part of the vineyard with what is produced at the bottom, to make a perfect wine. The wine of the higher part is by itself too dry and spirituous, and requires the mixture from the lower part to give it body. The substratum is in some places marl, and in other places decayed *(pourri)* rock. The cultivation is much the same as described for Chambertin. M. D'Ecrivain considers that the vineyard is of the proper degree of fulness when the plants are fifteen inches apart in every direction. In the course of from 12 to 15 years, all the plants in the vineyard will undergo the process of *provignage;* but the winter before last appears, from all accounts, to have injured the vines exceedingly, and they are every where digging out many of them which have not recovered from the effects of the frost. M. Ouvrard, the proprietor of Clos Vougeot, also possesses a portion of Chambertin, and it is probable that to this circumstance the latter is indebted for being brought into notice; for it appears to me indubitable that it only requires similar treatment to make a very large portion of the Cote d'Or produce wines equal to those of Vougeot and Chambertin. But it requires a large capital to effect this, and a knowledge of commerce to make it profitable; and the smaller proprietors appear in general to endeavor to make up by the quantity, for what they sacrifice in the quality, of their wines. From other accounts I am inclined to believe that the produce of a vineyard planted with the *gamé*, and manured, as stated to me at Dijon, viz. about 1000 gallons per English acre, was not much exaggerated. After having received from M. L'Ecrivain a small bundle of each of the kinds of vines cultivated in the Clos Vougeot, and thanking him for his kindness, I took my leave, and arrived at Dijon at rather a late hour.

Wednesday, 21st December, Rheims.—After having quitted the Cote d'Or, the seat of the famous vineyards of Burgundy, there appeared little to be worthy of my attention till I should reach Champagne; and I therefore made the best of my way for this town, the centre of the district, in as far at least as the chief trade in Champagne wines is concentrated there. For the last two days I had travelled through a bare, uninteresting country, consisting almost exclusively of a chalk subsoil, with a thin layer of vegetable mould on the surface. After quitting Dijon, few vines were to be seen till after having passed Chalons-sur-Marne, between which and Rheims are situated the *Sillery* vineyards, which produce the famous *still* wines of that name. The range of hills lies to the left of the road, and has an eastern exposure, in some places even to the north of east. The small town of Sillery is three or four miles from the nearest of them. During part of the journey from Dijon to Rheims, I travelled in company with an officer of artillery, who had gone to Algiers with the expedition, and had only returned to France about a month before. The French colony there remains almost stationary; owing to the insecurity of the settlers, there is little or no emigration. There are now 1,500 French troops in the country, and it would require not fewer than 40,000 to protect the settlers within 25 miles of Algiers. Allotments of land are only made to actual laborers, and not to a greater extent than from 8 to 20 acres each, and there is generally also a house and garden. The land granted by the French government was the property of those who abandoned their homes on the French taking possession; those who remained were undisturbed in their property. There are also extensive domains which belonged to the dey or the government. Merino sheep are plentiful, and in large flocks; the mutton is excellent. Beef is not so good. The French have made excellent wine from very delicious grapes. The civil courts of justice are still preserved as before and the same officers employed.

The same taxes are also raised, but they are of trifling amount. Most of the emigrants, including Swiss, Germans, Italians, and a few Spaniards, have become dealers, leaving to the Bedouins the cultivation of their land. The hostile Bedouins come down upon the outposts in bands of 15,000 or 20,000, but they cannot withstand the attacks of a small body of disciplined troops.

The very eminent wine house of Messrs. Ruinart and Son, of Rheims, are agents for Herries, Farquhar and Co.'s notes. Having called upon them to cash one of these, M. Ruinart, junior, conducted me over their wine cellars, which are very extensive, and all subterranean, consisting of three under-ground stores, one beneath another, all mined out of the limestone rock. The wine which has received the last attentions which it requires, and is ready for expediting to the consumer, is packed in large square masses, bottle above bottle, and side by side, with no other precaution to keep them steady than a lath passing along between the necks of one layer and the butts of the next layer above. They generally send the wine to the consumer at the age of three and four years, but after the first winter, it is all put in bottle. The stock, therefore, appears immense, and, indeed, it is very large, for not only are different qualities required but also different descriptions, to suit the varying tastes of their customers in England, America, and Russia, to which countries Messrs. Ruinart make their chief exports. A gentleman, with whom I travelled, told me he could buy very good sound Champagne at Chalons for two francs a bottle, and was then going to purchase 100 bottles at that price; but respectable wine merchants never send any to England under three francs a bottle. What is sent to England is more spirituous, and froths more strongly than what is sold for domestic consumption. The greatest and most minute attentions are necessary in preparing Champagne. The casks in which it ferments, after running from the press, are previously sulphured, to prevent the fermentation from proceeding to too great a length. It is twice clarified, during the winter, and in the month of March, before the return of spring has renewed the fermentation, it is bottled off. When in this state the bottles are placed in frames, diagonally, with their heads downwards. The lees are thus collected in the neck of the bottle; but they do not consider it necessary to uncork the bottles as soon as the wine is perfectly clear, nor is it considered that there is any danger of the wine spoiling if the return of warm weather should cause a recommencement of the fermentation, and remix the lees through the wine. On the contrary, they sometimes allow the lees to remain to ripen, as they term it, longer than usual. The wine, in general, remains in this state till the following winter; each bottle is then placed in a frame, and carefully uncorked. The contents of the neck of the bottle are emptied. It is filled up from another bottle of the same wine, and being recorked, only now requires age to give it all the perfection it is capable of. It of course often happens, that the wine has either undergone less than the usual fermentation, or, being stronger than usual, requires a greater fermentation before being put into bottles; and it consequently happens that the fermentation in the bottles is greater than they can bear, and that a large proportion of them burst during the first summer. The floors of the wine cellars are all covered with grooves sloping to a gutter, by which the wine which has burst the bottles is conveyed to a cistern in the floor; and as there is most perfect cleanliness observed, a part of the wine is thus sometimes saved.

Mr. Ruinart, Junior, is a large proprietor of vines at Ay, where the first qualities of frothing Champagne are made, and to this place he strongly recommended my proceeding, in order to have the most favourable view of the vineyards of Champagne, of which, he said, the cultivation was every where nearly similar, although conducted at different places with more or less care. He says the ordinary produce of his own vineyards is from 10 to 12 pieces, of about 46 gallons per arpent, which is about a 25th part more than an English acre; that is, from 440 to 530 gallons per English acre. Having determined on visiting Ay, M. Ruinart gave me a letter to his manager, but he said he expected him next day at Rheims, and would give him full instructions on seeing him.

Thursday, 22d December.—At six o'clock this morning I joined the voiture for Epernay, where I arrived at eleven o'clock. After breakfast I immediately proceeded to Ay, intending to return the next day also to meet the agent of M. Ruinart, should I not be satisfied with the information I might procure in his absence. Ay is a small town on the right bank of the river Marne, a little higher up than Epernay which is situated on the left bank. On both sides of the river there is a range of chalky hills, but separated also by a very beautiful meadow about a mile in width. These hills are of no great elevation, and are more or less steep, but in no place is the soil required to be supported by terraces. The range of hills above the town of Ay is exposed to the full south, except where the exposure is varied by recesses in the range; it consequently produces wine of the finest quality, and very superior to that of Epernay, which is produced on hills exposed to the north. I walked through the meadow with great difficulty and labor, the road being almost impassable in some places, owing to the depth of the mud. On arriving at Ay, I delivered my letter to Madam Hazart, the wife of M. Ruinart's manager, and expressed my doubts whether I should return the next day. She immediately called the *maitre vigneron* to proceed with me to the vineyard, and another to obtain the plants which the letter expressed my wish to procure. The depth of soil, before reaching the chalk on the hill of Ay, is, in most places, according to the report of the vigneron, 10 to 15 feet; nor is he aware of any difference being occasioned in the quality of the wine when the chalk comes nearer the surface, which happens a little farther to the east, where they also make wines of the first quality. The soil is strongly calcareous, full of small pieces of chalk, and of stones. Near the top of the hill the soil is more argillaceous and stronger than towards the bottom; and this, in some degree, affects the quality of the wine, but not in a great degree. The great difference is caused by difference in exposure, that to the south producing uniformly the best; where the soil is the same from the top to the bottom, the middle region of the hill is still the most valuable, for it is less subject to the injuries which early frosts frequently occasion in the lower region, and enjoys in general a warmer sun, especially towards

the close of the season, than the top. When the season has been extremely fine and warm from beginning to end, the wine of the higher and lower regions of the hill equals that of the middle region. If I was struck with the closeness of the plants in Burgundy, the closeness of these was more remarkable still. The vigneron said, that if it were possible to keep the vineyard fully furnished with plants, there would be one for each 8 or 9 inches in length, by 6 or 7 in breadth. The supposition which I made to illustrate the mode of *provignage* in Burgundy is actually realized here. Every year an addition is made to the bottom of the vineyard of a certain number of plants, and the whole of the vines are in a state of continual progression, being buried, and by that means carried 12 or 14 inches up the hill every third year. The process is of course not regular, for in every place there are plants in each stage of the progress which they pass through. According to the number of the voids to be filled, the branches of the stock that is buried are from two to four or five. On each of these branches, when pruned in the spring, are left two buds; these buds produce branches or shoots, which bear fruit the first year. The next spring three buds are left upon the higher, and two upon the lower of the two shoots, and the spring following they are pruned to bear shoots corresponding to the number of voids to be filled in their neighborhood, for their turn to be buried has again arrived. By this means, also, a supply of rooted plants is obtained when they are required; but when these rooted plants are cut off, and planted out, they never bear fruit till the third year. The *maître vigneron* said, he believed the roots never die. They frequently trace them to a very great length, but never disturb them, always burying the others above them. The produce per arpent, he says, sometimes amounts to 15 pieces, (660 gallons per acre,) and the small proprietors, who manure their vines more strongly, have frequently 16. M. Ruinart himself told me, that he knew instances of four arpents giving 100 pieces, 1,100 gallons per acre. The manure is always added to the plants which have been buried; a handful of earth is first put over the plant, and the manure above. They are, however, extremely cautious as to the quality of the manure. In some places I observed dung from the farm yard mixed with the soil, but in general it was only strong soil from the valley below, mixed with ashes, and other amendments of a mild description.

I here closed my examination of the vineyards of France, there being no point unexplained of sufficient importance to induce me to wait another day for the purpose of seeing M. Ruinart's steward. Next morning the *maitre vigneron* brought me three small bundles of plants, which, he said, were the only varieties cultivated in the vineyards which produce good wine. The black and white *Pineau*, according to M. Ruinart's statement, and as is generally understood, are the varieties of vines cultivated in Champagne, as well as in Burgundy. The vigneron brought me two black varieties, which he called the *plant vert*, and *plant dore*, and one white. The *plant dore*, he said, was introduced into the vineyards of M. Ruinart only a few years ago, and was not common in the country. It is much more productive than the other two varieties. These plants were all rooted, having been cut from stocks that had been buried the preceding season: they had each two branches, and are sold in the country at the rate of a halfpenny each. These plants were very abundant this season, for a vast number had been destroyed by the severity of the winter, 1829-30, and it was necessary to provide plants to replace them. To such an extent were the vineyards injured during that season, that in some places the quantity of wine produced did not exceed from 2 to 3 pieces per arpent. With such difficulties to overcome, the vineyards of Champagne and Burgundy are striking examples of the effects of industry and skill. Nothing can contrast more strongly than the small and puny shoots of the vines of Champagne and Burgundy, compared with the strong and vigorous branches of the vines of Spain; yet have the care and skill of the cultivators produced in the former countries, a wine equal in value to the best of those produced in the most favored climates, and, notwithstanding all their losses, much more abundant in quantity.

Having recorded with so much minuteness my observations on every vineyard and district through which I passed, I will avoid adding to the length of this journal by offering many general remarks. I cannot, however, refrain from observing, that from the albarizas of Xeres, the most southern vineyards of any reputation in Europe, to those of the chalky hills of Champague, amongst the most northern, I met with no vineyard producing dry wines of reputation, which was not more or less calcareous. Although it is acknowledged that two thirds of the vineyards of France are situated upon soil more or less calcareous, by Chaptal, and other writers upon the subject, they have stated, that provided the soil is porous, free, and light, its component parts are of little consequence; and they enumerate granitic, schistose, argillaceous, flinty, sandy, and calcareous soils, as equally well qualified to produce, and as actually producing, in different parts of France, wines of the finest quality. It appears evident to me, however, that these writers have, in many instances, been misled by the representations which have been transmitted to them; as, for instance, when Chaptal and Cavoleau* cite the wine of Hermitage as an instance of the excellence of wines produced upon the *debris* of granite; while the fact is, that the wine of the hill of Hermitage owes its superiority over the wines of the other hills in its neighborhood only to the circumstance of the granitic soil of a part of that hill being mixed with calcareous matter; and but for this circumstance, I am satisfied that the wine of Hermitage would never have been heard of beyond the neighborhood where it grows. I am therefore of opinion, that the finest dry wines owe their superiority chiefly to the quality of the soil; and I am much mistaken if it be not found that the soils of all vineyards producing dry wines of superior excellence are strongly calcareous. All my observations have led me to this conclusion, and I know of no instance to the contrary. It will be observed, that I here only speak of dry wines, for sweet wines of great excellence are produced in a variety of soils, and, in fact, owe their qualities more to the variety of the grape, and the manner in which it is treated, than to the soil. The sweet *Muscat* and *Old Mountain*

* Œnologie Française, ou Statistique de Tous les Vignobles de France. *Paris*, 1827.

wines of Malaga are celebrated all over the world; but though they have the same varieties of vines at Malaga as at Xeres de la Frontera, and pursue a similar practice in making the wine, the best of their dry wines, produced on a soil consisting of decomposed slaty schist are insipid and flavorless when compared with the Sherries which are produced on the chalky hills of Xeres. The sweet wine of Rivesaltes, the most celebrated in France, is produced on a granitic soil covered with pebbles; and the sweet wines of Cosperon and Collioure, in the same department, are produced on hills of schist, as nearly as possible resembling those of Malaga. But though the dry wines of both these soils are well known, they are not distinguished for their fineness or flavor. Their excellencies are their strength and rich color, which make them valuable for mixing with the weak and light colored wines of the ordinary growths of Burgundy and Macon, which supply the chief consumption of Paris.

The limited extent of the first-rate vineyards is proverbial; and writers upon the subject have almost universally concluded that it is in vain to attempt accounting for the amazing differences which are frequently observed in the produce of vineyards similar in soil, and in every other respect, and separated from each other only by a fence or a footpath. My own observations have led me to believe, that there is more of quackery than of truth in this. In all those districts which produce wines of high reputation, some few individuals have seen the advantage of selecting a particular variety of grape, and of managing its culture so as to bring it to the highest state of perfection of which it is capable. The same care has been extended to the making, and subsequent management of their wine, by seizing the most favorable moment for the vintage, by the rapidity with which the grapes are gathered and pressed, so that the whole contents of each vat may be exactly in the same state, and a simultaneous and equal fermentation be secured throughout; by exercising equal discrimination and care in the time and manner of drawing off the wine, and in its subsequent treatment in the vats or casks where it is kept; and lastly, by not selling the wine till it should have acquired all the perfection which it could acquire from age; and by selling, as the produce of their own vineyards, only such vintages as were calculated to acquire or maintain its celebrity. By these means have the vineyards of a few individuals acquired a reputation which has enabled the proprietors to command almost their own prices for their wines; and it was evidently the interest of such persons that the excellence of their wines should be imputed to the peculiarity in the soil, rather than to a system of management which others might imitate. It is evident, however, that for all this a command of capital is required, which is not often found among proprietors of vineyards; and to this cause, more than to any other, it is undoubtedly to be traced that a few celebrated proprietors have acquired, and maintained, almost a monopoly in the production of fine wines.

On my arrival at Paris, I waited upon the director of the Royal Nursery of the Luxemburg, and inquired whether I could get the deficiencies supplied in my list of vines procured at Montpelier. He replied, certainly; there would be no difficulty in the matter, for any plant could be procured from the nursery at a regulated price. That for vine cuttings was two francs and a half per hundred. I therefore delivered him my list, with the deficiencies marked, to the number of 133, and of these 110 were supplied, two plants each. I here also procured six cuttings each, of sixteen of the most valued varieties of vines which are cultivated in those provinces which I did not myself visit; and after very considerable difficulty, I obtained a copy of the printed catalogue of the Royal Nursery of the Luxemburg, including a list of the collection of vines.

From Stewart's Stable Economy.

ARTICLES USED AS FOOD FOR HORSES.

Kinds of food.—In this country horses are fed upon oats, hay, grass, and roots. Many people talk as if they could be fed on nothing else. But in other parts of the world, where the productions of the soil are different, the food of the horse is different. "In some sterile countries they are forced to subsist on dried fish, and even on vegetable mould; in Arabia, on milk, flesh balls, eggs, broth, &c. In India, horses are variously fed. The native grasses are judged very nutritious. Few, perhaps no oats are grown; barley is rare, and not commonly given to horses. In Bengal, a vetch, something like the tare, is used. On the western side of India, a sort of pigeon-pea, called gram (*cicer arietinum*) forms the ordinary food, with grass while in season, and hay all the year round. Indian corn or rice is seldom given. In the West Indies, maize, Guinea corn, sugar-cane tops, and sometimes molasses are given. In the Mahratta country, salt, pepper and other spices are made into balls with flower and butter, and these are supposed to produce animation, and to fine the coat. Broth, made from sheep's head, is sometimes given. In France, Spain, and Italy, besides the grasses, the leaves of limes, vines, the tops of acacia, and the seeds of the crab-tree, are given to horses."*

The articles upon which horses are fed in this country are usually arranged into three classes. That which possesses the least nutriment, in proportion to its bulk, is termed *fodder*, and consists of grass, hay and straw; that which possesses the most nutriment in proportion to its bulk, is termed *corn*. This word is often used as if it belonged exclusively to oats; but it is a general name for all the kinds of grain and pulse upon which horses are fed. In this work it is used only in its general sense. *Roots*, such as carrots, turnips and potatoes form the third kind of food. In relation to their bulk they have less nutriment than corn, and more than fodder. I do not think this classification is of any use, and here it will not be regarded, but it is well to know the meaning usually attached to the terms.

Green herbage.—There are several kinds of green meat, but the individual properties of each are so little known, that much cannot be said about them.

Grass is the natural food of horses. It is provided for him without the interference of art. It is

* Loudon's Enc. of Agric., p. 1004.

composed of a great number of plants, differing much or little from each other in structure, composition, and duration. Some of the natural grasses are to the horse mere weeds, destitute of nutriment, though not positively injurious. Several are rejected, or eaten only when there is nothing else to eat, and none are sufficiently rich to maintain the horse in condition for constant work, even though the work be moderate. At a gentle pace, he may travel a few miles to-day, but he is unfit for a journey to-morrow. By cutting the grass and bringing it to the stable, the horse may be saved the labor of collecting it; but still he can render very little service.

Grass, however, or green herbage of some kind, is given to almost all horses during a part of the year. The young animals, from the time they are weaned till they are fit for work, receive grass as long as it can be had. Hunting and racing colts excepted, they receive little else.

It is commonly believed that grass has some renovating and purifying properties not possessed by hay nor by corn. It is true that all the kinds of green herbage, including clover, saintfoin, lucerne, tares and ryegrass, produce a change upon the horse. But whether the change be for better or for worse, is another question. For the first two or three days, green meat relaxes the bowels and increases the secretion of urine and of perspiration. Very often it produces an eruption on the skin, particularly when given along with a large allowance of corn. When the horse is permitted to eat what he pleases, the belly becomes large. These effects may be termed immediate. They are most apparent at the commencement, but are visible so long as the horse receives any considerable quantity of grass. Green meat produces other effects not so easily traced. Wounds heal more kindly, inflammatory diseases are not so fatal, and chronic diseases frequently abate, or they entirely disappear under the use of grass. The horse, however, is always soft, when fed much on green meat. He sweats a great deal, and is soon exhausted by his work.

Clover, *ryegrass*, *tares*, *lucerne*, *saintfoin*, and the *oat-plant* are all used as green meat. So far as the horse is concerned, one seems to be as good as any of the others. They appear to produce the same effect as grass. Amid such variety we might expect to find some difference, but I have not been able to perceive any. Some horses, indeed, like one article better than another, but this seems to be mere taste, for no one of them appears to be generally preferred nor rejected. There are various opinions, however, as to the comparative value of these articles. Some affirm that clover is less nutritious than ryegrass, some that tares are poor watery feeding, and others that lucerne and saintfoin are the best of the whole lot. But opinion on the subject seems to be quite vague. Whatever one affirms another will be found to deny. In Scotland, lucerne and saintfoin are very little used; but clover, rye-grass and tares, are given each in their season, as if one were equal to another.

Beans, wheat, rye and oats, the whole plant, are sometimes, but very seldom, and never regularly, used as food for horses. Cabbage, and some other green articles, are eaten, but they deserve no particular notice. Several, which form the ordinary green meat of horses in other countries, are not grown here. The leaves and clippings of the vine are much used in many parts of France.

Whin, *Furze*, or *Gorse*. This is an abundant and cheap plant. It is very good green meat for horses, and is procured when there is no other. To sick horses it is an excellent substitute for grass, and many will eat it when they will eat nothing else; but it has been extensively tried as an article of ordinary feeding. It has long been used in many parts of Wales and Scotland, and in several of the Irish counties. Mr. Tytler of Balmain was the first, I understand, to publish a useful account of its properties. His essay will be found in the fifth volume of the Highland Society's Transactions. "It appears that, for five successive years, Mr. Tytler fed his farm horses from the beginning of November to the middle of March, on furze and straw, with a very moderate allowance of oats during only a part of that time. At first oats were given throughout the winter, but afterwards only from the beginning of February, and then only at the rate of three pounds two oz., or about one third of a peck, of average quality to each; the daily allowance of furze during the first period being twenty-eight pounds, and during the second eighteen pounds, with fourteen of straw.

"The whins were cut by a woman. Provided with a pair of stout hedge gloves, a sheep-skin apron, a reaping hook, and a forked stick, she drew the plants to her with the fork, and cut off the succulent shoots of the year's growth. These being laid in bundles compressed by a stroke of the foot, were ready for carting. Sufficient for a dozen horses at their fullest feed, could be cut in six or seven hours. A mule and boy carted the load to the farm yard, where the mule was yoked to a bruising mill. This consisted of an old millstone, mounted upon a horizontal axle twelve feet long, attached by one end to a post, round which the stone revolved on a paved circular bed, eight feet in diameter. To the other extremity a swingle-tree was hung for yoking the mule. The whins were spread in the course, and turned over until sufficiently crushed. This process occupied about three hours.

"The daily expense of feeding eight horses was thus calculated by Mr. Tytler:

	Nov. to Feb. s.	d.	Feb. to Mar. s.	d.
Woman's wages,	0	6	0	4
Part wages of boy,	0	4	0	3
Part keep of mule,	0	4	0	3
1 cwt. of straw,	2	0	2	0
25 lbs. of oats,	0	0	2	6
	3	2	5	4"

By this it appears that the keep of each horse per day amounted to only fourpence three farthings in the first period, and eightpence in the second. The work was the same as that of other Berwickshire teams, which is by no means light; and Mr. Tytler says, the horses not only kept, but improved their condition during the whole season; but they began to show a distaste to the whins about the commencement of spring.

Furze is generally used on the frontiers of France and Spain; and the British cavalry while in the Pyrenees, under the Duke of Wellington, had no other forage.

According to the Mid-Lothian Report (Appendix, No. vi, p. 56) it has been found that an acre of whins is sufficient for six horses, during four months; that they require two years to produce

them; that horses, with whins, and one feed of corn, were in as good order as with two feeds and straw;* that all the straw and one feed of oats were thus saved; that, valuing these at sevenpence a day each horse, the saving in seventeen weeks amounted, on the six horses, to £17 17s.—from which, deducting five shillings a week, as the expense of cutting and bruising, there would remain £13 12s. as the product of two acres.†

Dry herbage.—In this country the dry herbage consists of hay and straw. In France, the vine leaves are collected and stored for winter fodder. In the West Indies, the tops of the sugar cane are deemed highly nutritious, after they are dried and sweated a little in heaps. In a season of abundance, ricks of the cane tops, the but-ends in, are made in the corner of each field, to supply the want of pasturage and other food. These are chopped small, and mixed with common salt, or sprinkled with a solution of molasses. Maize is sometimes made into hay. "When Guinea or Indian corn is planted in May, and cut in July, in order to bear seed that year, that cutting properly tedded, makes an excellent hay, which cattle prefer to meadow hay. In like manner, after the corn has done bearing seed, the after crop furnishes abundance of that kind of fodder, which keeps well in ricks for two or three years.‡ "In some places, dried ferns, reeds, flags, small branches or twigs are dried and used as substitutes for hay."§ Doubtless there are many other plants made into fodder in different parts of the world. Where Canary corn is raised, the chaff and straw are given to horses, from which it is said they derive more nutriment than from hay.

Hay.—In Scotland most of the hay used for horses is composed of ryegrass, or ryegrass and clover. The natural hay, which is not very much used here, contains several plants. Much of the hay in Scotland is bad. A good deal is grown on poor land, and this is soft, dwarfish, and destitute of nutriment. But hay in general is not well made. In the south it is cured with more skill, and preserved with more care. The best we have in the west of Scotland is procured from Stirlingshire, and is composed of ryegrass and a little clover.

In England clover-hay stands in high repute for hard-working draught horses. In the market it brings 20 per cent. more than meadow or ryegrass hay. Hard upland meadow is preferred for hunters and racers, because I suppose they are apt to eat too much of the clover. In Scotland, ryegrass, or a mixture of ryegrass and clover, is considered the best for all horses. Here we have almost no good meadow hay, and most of that made from the natural grasses is hardly worth preserving.

Good hay is about a year old, long and large, hard, tough; its color inclining to green, rather than to white; it has a sweet taste and pleasant smell; the seed is abundant; infused in hot water, it produces a rich dark-colored tea. The less dust it has about it the better; but, from the soil, and the way in which hay is made here, it is seldom free from dust. In damp weather hay absorbs much moisture, and weighs a good deal the heavier. In England, the market weight of new hay is sixty pounds per truss till the 4th of September. The truss of old hay contains only fifty-six pounds.

New hay is purgative and debilitating. It seems to be difficult of digestion. The horse is fond of it, and will eat a large quantity, much of which passes through him little altered by the digestive process, and probably retaining a good deal of its nutriment. On the other hand, hay which is very old, is dry, tasteless, brittle. The horse rejects much, and eats little. Old hay is much recommended; but by old, I suppose is meant not new. In the south, perhaps stacked hay does not so soon degenerate as in the north, where it is certainly old enough in one year.

Heated hay, sometimes termed mowburnt, is that which has undergone too much fermentation. In curing hay it is thrown in a heap to sweat, that is, till a slight degree of fermentation takes place, which is arrested by exposing the hay to the air. This, it appears, is necessary for its preservation in the stack. But sometimes the process is carried too far, or, more frequently, it is re-excited, after the hay is stored past. Hay that has been thus injured is not all alike. Some of it acquires a very sweet sugary taste; and this portion is eaten; some is changed in color to a dark-brown, and has its texture altered; it is short, brittle as rotten wood, and has a disagreeable taste; this portion seems to be rejected; another portion of the same stack is mouldy, stinking, quite rotten, and no horse will eat this. All kinds of hay, however good originally, may suffer this injury. When the damage has been slight, most horses will eat certain portions of the hay very greedily; they seem to be fond of it for the first week, but subsequently it is rejected in disgust. Upon the whole, I believe it is the most unprofitable fodder that horses can receive. When very bad, it is dear, though obtained in a gift, for it often does much mischief, particularly to horses of fast-work. Much is wasted, and that which is eaten does little good. It is almost as poisonous as it is nutritious. Slow draught-horses may not, indeed, be greatly injured by it. But good wheat-straw may be better. To fast, hard-working horses, such as those employed in mails, it is a strong diuretic; and its diuretic power does not diminish by use. Hay forms an important part of the horse's food, particularly of those horses that receive no roots nor boiled meat. Bad hay will change the horse's appearance and condition in two days, even when he has an unlimited quantity of corn. By bad hay, I mean that which is unwholesome. It may be poor, having little nutriment, but sweet and digestible, without being pernicious. But good straw is better than unwholesome hay for all kinds of horses. The kidneys are excited to extraordinary activity. The urine, which, in this disease, is always perfectly transparent, is discharged very frequently and in copious profusion. The horse soon becomes hidebound, emaciated, and feeble. His thirst is excessive. He never refuses water, and he drinks as if he would never give over. The disease does not produce death, but it renders the horse useless, and ruins the constitution. Should he catch cold, or take the influenza which prevail-

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* The "order," I suspect, would be nothing to boast of.

† British Husbandry, Vol. i. p. 135. See also the Annals of Agriculture, Vol. xxxv. p. 13. Ency. Brit. art. Agriculture. Farmer's Mag. Vol. xx. p. 282. Comp. Grazier, fifth ed. p. 559; and Quar. Journal of Agric. No. xi.

‡ Bracy Clarke's Pharmacopœia Equina.

§ Blaine's Outlines of Vet. Med.

ed so much in Glasgow during the winter of 1836, glanders is seldom far off.* This worthless hay is always sold at a low rate, and much of it enters the coaching stables. But I am perfectly sure that it would be cheaper to pay the highest price for the best. One ton of good hay will, unless the men be excessively careless, go as far as two tons of that which is bad. To slow-work horses, mow-burnt hay may be given with less detriment, but it is least unprofitable when consumed by cattle.

Musty hay is known by its bad color, its unpleasant smell, and bitter taste. It is soft and coated with fungi. Like all hay, its smell is most distinct when slightly dampened by breathing upon it. Old hay is often musty, without having been heated. None but a hungry horse will eat it, and when eaten in considerable quantity it is said to be "bad for the wind." In truth, it is bad for every part of the body. In some places they sprinkle this musty hay with a solution of salt, which induces the horse to eat it, but even thus, it answers better for bedding than for feeding, and to that purpose the horse applies most of it.

Weather-beaten hay is that which has lain in the sward exposed to the rain and the sun. It is musty, full of dust, sapless, bleached, or blackened, and destitute of seed. Such, also, is the state of that which has stood too long uncut. All hay should be cut a few days before the seed is quite ripe. After it has lost most of its seed, and its juices, little is left to afford nutriment.

Salted hay, that is, hay with which salt has been mingled at the time of stacking it, is not much used in Scotland. It is not to be had. I can tell nothing about it. Horses are said to prefer it to any other. But the principal motive for salting hay is to preserve it when the weather requires that it be stacked before it is sufficiently dry. Salt prevents or checks fermentation. It darkens the color of the hay and makes it weigh heavier, for salt attracts moisture. Salt, I think, should not be forced on the horse. It may excite too much thirst. Given apart from the food, he may take all that is good for him. Damaged hay is often sprinkled with salt water, which seems to render it less disgusting, and may possibly correct its bad properties. It should be wetted as wanted, for it soon becomes sodden and rotten.

The daily quantity of hay allowed to each horse must vary with its quality and the work. If the corn be limited, the horse will eat a greater weight of poor hay than of that which is more nutritious. If it be damaged, he must consume more than if it were sound, for he rejects some, perhaps a half, and that which he eats does not furnish so much nutriment. When the work is fast, the horse must not have so much as to give him a large belly. Eight pounds of good hay is about the usual allowance to fast-working horses, that may receive from twelve to fifteen or eighteen pounds of corn. Large draught-horses will consume from twenty to thirty pounds, but the quantity is seldom limited for these. Much, however, depends upon the allowance of corn. A German agriculturist calculates that eight pounds of meadow-hay, or seven of that made from clover, tares, or saintfoin, afford as much nourishment as three pounds of oats. Of the hay raised on poor soils, nine pounds may be required.

A horse can live on hay and water, when thrown off work, for a considerable period, he often receives nothing else. This is not always right. The horse becomes so feeble and so pot-bellied that it is long ere better food will restore his condition for work. A little corn, some roots, or a bran-mash, though given only once in two days, will help to keep him in flesh. I have heard of the horse being kept almost entirely on hay, receiving corn only when he was to be used. I would recommend the owner to confine himself to bread and water for a week or two, and then try what a beaf-steak will enable him to do. There is a material difference between eating to live, and eating to work. The stomach and bowels will hardly hold sufficient hay to keep even an idle horse ailve.

The only preparation which hay receives before it is given, is that of cutting it into chaff, into short pieces. When given uncut, the groom does, or should shake out the dust before he puts it in the rack.

Hay tea.—An infusion of hay made by pouring boiling water upon it, and covering up till cool, has been recommended as an excellent nutritious drink for sick horses, and also for those in health. It might perhaps be a very good substitute for gruel; perhaps a quart or two of the tea might not be a bad thing for a racer, given between heats, and towards the end of the day, when the horse is beginning to get exhausted from fasting, but it has not been tried.

Hay-seed.—In Scotland, and wherever the hay is made chiefly from rye-grass, the seed is often made use of in feeding. It is sometimes mixed with the oats to prevent the horse from swallowing them whole, but most generally it is given along with the boiled meat, either to divide it or to soak up the liquor. It contains more nutriment than the hay itself, but probably not a great deal, unless the hay has stood too long uncut. Some people say that hay-seed is bad for the wind, but I have never been able to trace any evil to its use. There is always much dust mingled with it, and this should always be removed by washing. Sometimes the meat is boiled, and sometimes merely added to the boiled meat while it is hot. I do not know that boiling improves it, but it is much better liked after boiling or masking than in its raw state.

Straw.—There are five kinds of straw used as fodder. I have not been able to learn that rye-straw is ever used as fodder in this country. Of the white kinds, wheat is supposed to be most nutritious. Some, however, like oat-straw as well. Barley-straw is almost useless for fodder, and is not used when any other can be obtained. Pea-straw is better than that of beans; it has been recommended as equal to hay, and I have not much doubt but it is much better than some hay. Straw, however, is little used here. In many parts of Europe, wheat, barley, or rye-straw forms the whole or greater part of the dried herbage, hay being almost unknown. In some of the towns wheat and oat-straw are occasionally given to cart-horses, and in some cases to coaching-horses. In the country, both white and black straw are in common use as winter fodder for the farm-horses.

* The influenza I mean, was not at all similar to a disease which went under the same name at the same time in England. We had almost none of the English influenza till the last week of May, 1837. In the month of June it was very prevalent.

It is very probable that wheat-straw, and perhaps some of the others, may soon be used much more extensively than at present. Good straw is certainly better than bad hay, and possibly, by increasing the allowance of corn, and cutting the straw, hay might be almost entirely dispensed with. Though containing much less nutriment, it still contains some, and it serves quite as well as hay to divide the corn and give it a wholesome size. It must be understood that food ought to possess bulk proportioned in some degree to the capacity of the digestive organs. Nutriment can be given in a very concentrated state, yet it is not proper to condense it beyond a certain point. Corn alone will give all the nourishment which any horse can need, but he must also have some fodder to give bulk to the corn, though it need not of necessity yield much nutriment. Straw, therefore, may often be used where hay is used. This has been proved very fairly in this country. Mr. Mein, of Glasgow, kept his coaching-horses in excellent order for nearly eight months, without a single stalk of hay. During dear hay seasons it is the custom, with many large owners, to make straw from a part of the fodder. Wheat-straw is preferred, but few object to that of the oat.

But when horses are living chiefly on hay, as many farm horses do, during a part of the winter, it must not be supposed that an equal quantity, or indeed any quantity of straw, will supply the place of that hay. The stomach and bowels will hardly hold hay enough to nourish even an idle horse, and as straw yields less nutriment in proportion to its bulk, enough cannot be eaten to furnish the nutriment required. The deficiency must be made up by roots or corn.

When much straw is used, part or the whole ought to be cut into chaff. It is laborious work to masticate it all, and in time it will tell upon the teeth, which in old horses are often worn to the gums, even by hay and corn.

Bean straw is tough and woody, and horses soon get tired of it. But I am persuaded that it might be advantageously made into tea. Bean-straw tea is much esteemed as a drink for milch cows, and if not found equally good for horses, no harm can be done by trying it. Pea-straw also makes very good tea, but the straw itself can be entirely consumed as fodder. The white straw seems to make a very weak infusion. All the kinds of straw soon grow sapless and brittle. They should be fresh.

Barn chaff.—The shell which is separated from wheat and oats in thrashing is often given to farm-horses. It seems to be very poor stuff. It looks as if it contained no nutriment, yet it may serve to divide the corn, to make the horse masticate it, and to prevent him from swallowing it too hurriedly. In this way it may so far supply the place of cut fodder. But the barn chaff is usually mingled with the boiled meat, and if the articles be very soft, the chaff may give them consistence, but it does little more. The coving chaff of beans is said to form very good manger meat.

Roots.—Potatoes, carrots, and turnips are the roots chiefly used for feeding horses. Parsnips, mangel-wurtzel, and yams are occasionally employed.

Potatoes are given both raw and boiled; in either state they are much relished by all horses as a change from other food. They are rather laxative than otherwise, and especially when given uncooked. Given raw and in considerable quantity to a horse, not accustomed to them, they are almost sure to produce indigestion, when boiled or steamed they are less apt to ferment in the stomach. For horses that do slow, and perhaps not very hard, or long-continued work, potatoes may, in a great measure, or entirely, supersede corn. They are little used for fast-work horses, yet they may be given, and sometimes they are given without any harm. On many farms they form, along with straw fodder, the whole of the horse's winter food.*

According to Professor Low, fifteen pounds of raw potatoes yield as much nutriment as four and a half pounds of oats. Von Thaer says, that three bushels are equal to 112 lbs. of hay. Curwen, who tried potatoes very extensively in feeding horses, says that an acre goes as far as four acres of hay. He steamed them all, and allowed each horse daily, a stone and a half, with a tenth of cut straw which he preferred to hay for this mode of feeding.

The potatoes should be of a good kind, and not frosted. They should always be cooked either by steaming or boiling. They are best when steamed. Horses like them as well raw, but they are excessively flatulent, and this bad property is much corrected by cooking, and by adding some salt. When boiled, the process should be performed with as little water as possible. When nearly ready, the water should be altogether withdrawn, and the potatoes allowed to dry, uncovered, on the fire for a few minutes. They should be put on with cold water. They are always over-boiled. Horses prefer them when hard at the heart. There is a general prejudice against the liquor in which potatoes are boiled. It is said to be injurious. In small quantities it certainly produces no apparent evil. I often see it given, not as a drink, but along with potatoes, beans, and chaff, which are all boiled together and mixed into a uniform mass, in general too soft. In some places the potatoes are not washed when boiled. If the earth does not relax the bowels, I am not aware that it does any injury, and the horses do not appear to dislike it. When the mass, however, from the addition of chaff, requires much mastication, this sand or earth must wear down the teeth very fast.

Turnips are in very general use for farm and cart-horses. Of late they have also been used a great deal in the coaching-stables; in many they have superseded the carrot. The Swedish variety is preferred. Common white turnips are almost worthless. According to Von Thaer, 100 pounds are equal in nutriment to 22 of hay. For slow horses, turnips to a certain extent supersede corn, but for fast-workers, they save the hay more than the corn. They have a fine odor when boiled, and this seems to make the horse feed more heartily. They fatten the horse very rapidly, and produce a smooth glossy coat and loose skin.

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any meal. It does very well as a masticant; and may be mingled with oats, beans, or barley to make the horse grind them, but it cannot yield much nutriment, and many horses will not eat it.

Gruel is made from oatmeal. It is very useful for sick horses: and, after a day of severe exertion when the horse will not take solid food, gruel is the best thing he can have. Few stablemen are able to make it properly. The meal is never sufficiently incorporated with the water. One gallon of good gruel may be made from a pound of meal, which should be thrown into cold water, set on the fire and stirred till boiling, and afterwards permitted to simmer over a gentle fire till the water is quite thick. It is not gruel at all if the meal subside, and leave the water transparent. Bracy Clarke recommends that the meal be well triturated with a little cold water, in a beechen bowl, by a heavy wooden pestle. He thinks the trituration necessary to effect a union between the water and some constituent of the meal. This seems to be one of the "not a few useful and important discoveries" for which Mr. Clarke so clamorously demands our homage.

Oaten bread is sometimes given to sick horses. It may tempt the appetite and excite a disposition to feed.

Barley.—There is much difference of opinion concerning this article. Some consider it quite as good as oats in every respect; others allege that it is too laxative; others that it is heating; some that it is cooling; and some that it is flatulent. In Spain, and in some other places, horses and mules receive no corn but barley; in this country it is very often boiled and given once a-day, and sometimes a little is given raw with every ration of oats; and one or two proprietors have used, and perhaps still use it to the entire exclusion of oats. I cannot, from personal observation, tell what are its effects when given habitually without mixture. But when given along with a few oats or beans, so as to form only a part of the feed, I know that barley has none of the evil properties ascribed to it. I am daily among a large number of horses, both fast and slow-workers, who receive a considerable quantity in the course of the twenty-four hours. At first, it relaxes the bowels a little, and unless it be mingled with chaff the horses swallow the grain whole. They seem to swallow it more readily than oats. After a week or two the bowels return to their ordinary state. The skin and the coat are almost invariably improved by barley, particularly when boiled and given warm. Like every other kind of corn it is somewhat indigestible, until the stomach becomes accustomed to it. If much be given at first, the horse is likely to take colic. But by gradually increasing the quantity from day to day, deducting the oats in proportion, the horse may be safely inured to barley without any other corn.

White tells us of a Southampton postmaster, who fed his horses entirely on barley and cut straw. They were given together, and the barley was steeped in water twelve hours before it was given. Two pecks of barley and one bushel of straw formed the daily allowance. It is said that, upon this, "the horses did more work, and were in better condition, than others at the same task upon the ordinary feeding." This is the usual story whenever any new mode or article is recommended. But, nevertheless, it seems sufficiently clear that barley is not much, if at all, inferior to oats. The price should influence the choice. Spotted or dark-colored barley, though rejected for malting, may be quite good enough for corn, and it is often to be bought at the price of oats. It weighs about fifty pounds the bushel. Giving weight for weight of oats, at forty pounds the bushel, there are only ten feeds, while barley gives twelve and one-half.

Boiled barley is used chiefly among stage, cart, and road-horses. It is rarely given to the racer or to the hunter, except when sick. Boiled to jelly, it is good for a hard dry cough, when there is no fever.

Barley mash—just barley steeped or boiled.

Malted barley is that which has been germinated. It is steeped or moistened, and spread in a layer till it sprout. In that state it is given, though not very often. Horses are very fond of it, and they will take a little of this when they refuse almost every thing else. But I do not know how they would do upon it for constant use.

Malt is used a good deal on the continent, and is supposed to be highly nutritious, more so than the raw barley. But in this country the heavy duty upon malt forbids its use for horses; and it is not certain that the process of malting improves the grain so much as to pay its cost.

Malt dust, in some places termed *cumins*, is that portion of barley which sprouts in germination. It is generally given to cattle, but horses sometimes get it mixed with the boiled meat. They seem to like it very well. I do not know any more about it.

Grains, the refuse of breweries, are sometimes given to horses, and are eaten greedily; but it is alleged that, when given constantly, and so as to form the bulk of the corn, they produce general rottenness, which I suspect in this case means disease of the liver. They are also blamed for producing staggers and founder.

Barley dust is rather better than corn dust, but it is fitter for cattle or swine than horses.

Wheat.—There is a general prejudice against wheat as horse-corn, especially in its raw state. It is supposed to be poisonous; and without doubt many horses have been destroyed by it. Horses eat it very greedily, and are almost sure to eat too much, when permitted. Fermentation, colic, and death are the consequences; but these are easily avoided. The grain seems difficult to masticate and also difficult to digest, and colic may be produced more readily by one lippy of wheat than by two of oats. I have never known it used to the exclusion of oats, but it is sometimes given in quantities not exceeding four pounds per day, and that divided among five feeds. Given in this quantity and in this way, it does no harm that any other corn will not do; and it appears perfectly to supply the place of the oats which are withheld for it. For every four pounds of wheat, four pounds, or nearly four and a-half, may be deducted from the ordinary allowance of oats.

Still, unless the use of good wheat renders the feeding cheaper, I do not see that it has any good property to recommend it. If a stone of wheat can be bought for less money than a stone of oats or beans, it may form a part of the corn, using it at first very sparingly, and not exceeding the quantity I mention, four pounds per day. A larger quantity may be tried on two or three horses, but

as I have not seen it tried to a greater extent, I cannot tell what might be the result.

Wheat should never be given alone. Chaff, straw-chaff is best, serves to divide it, and ensures complete mastication. The wheat mixes better with the chaff when it is flattened with a pair of rollers.

Boiled wheat is in common use. It is boiled with beans and chaff, and generally forms the last feed, or the last but one, at night. It soon gets sour, and makes the mangers of wood very foul. No more should be boiled nor given than will be consumed before next morning. It should not be boiled to a jelly. It should always be mixed with chaff.

The husk of wheat is very useful, and employed in all town stables. It goes under several names, of which the principal are bran, and pollard, hen-meal, and gudgings. There are two kinds, the one much finer than the other. The coarsest is most usually termed bran; pollard is supposed to contain and to yield more nutriment; but the difference does not appear to be great.

Bran is seldom given in its dry state, but when beans or peas form the bulk of corn, some dry bran is added, to make the horse masticate them, and to correct the constipating property of these articles.

Bran-mash is the usual food of sick horses; it relaxes the bowels. Its laxative property has been supposed to depend upon mechanical irritation, which cannot be true, since bran is constipating to dogs. It contains little nutriment, but supplies the place of corn to an idle or a sick horse, when he must be kept low; and it helps to keep the bowels in order when the horse is confined to hay without corn. The bran-mash is given either cold or warm. Some horses like it better in one way than another; some will not eat it when mashed, but will take it dry, and a few seem to dislike it altogether. The *cold bran-mash* is usually made with cold water; as much being poured upon the bran as it will absorb. The *warm mash* is made with boiling water. The mash should be closely covered up till cool enough to be eaten. When oats, beans, and hay form the ordinary feeding, it is usual to give a large bran-mash, about half a pailful once a week. It relaxes the bowels, operating upon them very gently, and clearing out their contents. In Scotland, road and canal-horses work none on Sunday. On Saturday night they get a bran mash instead of their ordinary feed of corn; but when grass or boiled meat is in season, bran is not generally used in this way. When the horses are in high condition, with bowels liable to constipation, the bran-mash prevents any evil that might arise from Sunday's rest; but when low in flesh, doing all the work they can bear, they can hardly afford to lose a meal, even though they rest on Sunday. If the bowels be costive, the mash may be given, but the corn should be given too; not both together, for a bran-mash almost compels the horse to swallow his corn without mastication.

Many stableman add bran to the boiled food. They seem to think its use indispensable; they talk as if the food could not be eaten or not boiled without the addition of bran. This is nonsense. The food may be of constipating quality, and bran will be wanted to correct that; or the horse's health or his work may make bran a useful article in his food. But to give bran as nourishment to a horse under ordinary circumstances, is to give him almost the dearest food he can live upon, even when his work does not absolutely demand stronger food. A shilling's worth of oats is a great deal more nourishing than a shilling's worth of bran. To the horse, bran is just what gruel is to man; but the relative cost of the two is very different.

Wheaten bread, either brown or white, is much relished by nearly all horses. Occasionally it may be given to a horse that has been tired off his appetite, or to an invalid. It should never be less than twenty-four hours old, and it should be given only in small quantity. Bakers sometimes give their horses a good deal of it, but it ought to be mixed with chaff. Some will not eat it till it is mashed by pouring boiling water over it.

Buck-wheat, or brank, is hardly known in this country. It is used on the continent, and the horses are said to thrive on it. Young says that a bushel goes farther than two of oats, and that, mixed with at least four times as much bran, one bushel will be full feed for any horse for a week. The author of the Farmer's Calendar thinks he has seen it produce a stupifying effect; and Bracy Clarke says it appeared to him to be very laxative. In Holland and many parts of Germany and Norway, it is made into a black bread, with which the horses are fed.

Maize or *Indian-corn*, is much used as a horse-corn in America, and in various parts of Europe. Cobbett recommended its introduction, and among its other uses, spoke of horse-feeding. I do not know that it has been tried sufficiently to determine whether it might be used with advantage during a scarcity of other corn. Probably it ought to be boiled and mixed with chaff, but horses eat it greedily when raw. Bracy Clarke says it is apt to clog the stomach and affect the feet in such a singular way, that the hoofs frequently fall off when the horse is on a journey. He alludes to founder, but seems ignorant that any kind of corn, when improperly given, will produce the same effect. Perhaps maize does it more readily.

"*Rye* is very generally employed as horse-corn in North America. It is coarsely ground, and sprinkled over straw and clover chaff, previously wetted, by which means the whole mass is well incorporated; mastication also is so much assisted, that no part is wasted, and the condition of the carriers' horses on the roads in Pennsylvania, where they are universally fed in this way, and are seldom lodged in a stable, proves the excellence of the practice. Rye is also used in Germany, but generally in the shape of bread made from the whole flour and bran; and it is not unusual, in travelling through some parts of that country, and of Holland, to see the postilions help themselves and their horses from the same loaf."*

Beans.—There are several varieties of the bean in use as horse-corn, but I do not know that one is better than another. The small plump bean is preferred to the large shrivelled kind. Whichever be used, the beans should be old, sweet and sound. New beans are indigestible and flatulent; they produce colic, and founder very readily. They should be at least a year old. Beans are often ill-harvested; and when musty or mouldy, though quite sweet internally, horses do not like them. They are often attacked by an insect which consumes much of the flour, and destroys the vital-

* British Husbandry, vol. i. p. 746.

ity of the rest. The ravages of the insect are plain enough. The bean is excavated, light, brittle, and bitter tasted. A few in this state may do no harm; but when the beans are generally infected, it is not likely that they are eaten with impunity, and very often the horse refuses them altogether. Damp, musty, ill-kept beans, though old, are as flatulent as those which are new. All kinds are constipating.

Though in very general use for horses, beans are not so extensively employed as oats. According to the chemists, they contain much less nutriment; but in practice it is universally allowed that beans are much the stronger of the two. The comparison however, is almost always made in reference to a measured quantity. A bushel of beans is, beyond all doubt, more nutritious than a bushel of oats, but it is questionable whether a pound of beans is stronger than a pound of oats. Beans weigh about sixty-three pounds per bushel, and if given in an oat measure the horse may be getting nearly double allowance. This, I am persuaded, often happens, and hence arise those complaints about the heating, inflammatory nature of beans. The horse becomes plethoric; the groom says the humors are flying about him. It is very likely that he would be in the very same state if he were getting an equal weight of oats.

If the beans do not afford more nutriment, weight for weight of oats, they at least produce more lasting vigor. To use a common expression, they keep the stomach longer. The horse can travel further; he is not so soon exhausted. "I remember," says Nimrod, "hearing Mr. Hoare exclaim, as his hounds were settling to their fox, 'Now we shall see what horses eat old oats, and what eat new.' I am inclined to think that this distinction may be applied to horses that eat beans, and those that eat none, for they help to bring him home at the end of a long day, and support his strength in the run." I believe Nimrod is quite right. In the coaching-stables beans are almost indispensable to horses that have to run long stages. They afford a stronger and more permanent stimulus than oats alone, however good. Washy horses, those of slender carcass, cannot perform severe work without a liberal allowance of beans, and old horses need them more than the young. The quantity varies from three to six pounds per day, but in some of the coaching-stables the horses get more, a pound of oats being deducted for every pound of beans. Cart horses are often fed on beans, to the exclusion of all other corn, but they are always given with dry bran, which is necessary to keep the bowels open, and to ensure mastication. Beans are not in general use for race-horses, but are sometimes given to bad eaters. They are usually split and hulled, which is a superfluous process. For old horses they should be broken or bruised.

Some horses will not eat beans. The Irish horses, when first brought to this country, always refuse them; they invariably pick out the oats and leave the beans. It does not appear that they dislike them, for after they begin, they feed as well as other horses. Ultimately, they seem to discover that beans are for eating, although it is often a long time ere they make the discovery.

The horse however, may soon be taught. Let him fast for an hour beyond the feeding-time, and then give him *half* a ration of beans without oats. If he still reject them, offer them split or broken, or moisten them, and sprinkle a little oatmeal over them, sufficient to make the beans white. If he still demur, put another horse, a hungry one, beside him, and he will soon teach his ignorant neighbor.

Bean-meal, or flour, is sometimes added to the boiled food; but it is oftener given in the water to cure the staling-evil.

Peas are seldom used without beans, with which they are mixed in large or small quantities. They may be given without either beans or other corn, but much care is necessary to inure the horse to them. Peas seem to be very indigestible, more so than beans, and perhaps as much so as wheat; but when given very sparingly at first, they may be used with perfect safety. It is often said that peas swell so much in the stomach as to burst it. This is an error. Peas do absorb much water, and swell more perhaps than beans, but they never swell so much as to burst the stomach, for the horse cannot or will not eat such a large quantity. When the stomach is burst it is from fermentation, not from swelling of the peas. All kinds of food will produce the same result when the horse is permitted to gorge himself, or when he is fed in full measure upon food that he has not been accustomed to; but peas seem to be rather more apt to ferment than some other corns.

Peas should be sound, and a year old. They weigh, on an average, sixty-four pounds per bushel. Pea-meal is sometimes given in the same way, and for the same purposes as that of the bean. Some prefer it for diabetes, and in a few places it is given in the water for baiting on the road.

Vetch seed has been employed for feeding horses, but I have learned nothing of the result.

Bread.—In former times it was customary to feed horses with bread, and the statute-book is said to contain several acts of parliament, relating to the manner of making it. Gervase Markham, a very old author, says, "Horse bread which is made of clean beans, clean peas, or clean fitches, feedeth exceedingly." It is not many years since a bread, composed of wheat, oats, barley, and beans, ground and mixed in varying proportions, was used in the racing-stables. The bread was well baked, and given when sufficiently old to crumble down and mingle with the corn. Eggs and some spices were sometimes introduced in making it. Nothing of the kind, so far as I know, is now used in this country.

In different parts of Europe bread forms the customary corn of the horses. A French periodical of 1828 mentions an agriculturist "who fed his horses with a bread composed of thirty bushels of oatmeal, and an equal number of rye-flour, to which he added a portion of yeast, and nine bushels of potatoes reduced to a pulp. With this bread he kept seven horses, each having twelve pounds per day in three feeds. It was broken into small pieces, and mixed with a little moistened chaff." He had feed his horses in this way for four years. Previously, he had used oats, hay, and straw chaff. The translator says he saved forty-nine bushels of oats in twenty-four days. But this is nonsense, for he had only seven horses. I take the quotation from "The Farrier and Naturalist," a dead journal.

The Magazine of Domestic Economy is not much better. The February number for 1837

tells us, that one ton of oats made into bread yields more nutriment than six tons of the raw article, and that in Sweden this has been proved by experience. It has never been proved in Scotland, and I dare say it never will. It is true, however, that a bread composed of oatmeal and rye, in equal quantities, has long been used for horses in Sweden. It is broken down and mixed with cut straw. It is in common use over different parts of Germany. I cannot learn any particulars as to the mode of making, nor of the quantity given nor of the horses' condition. In France many attempts have been made to produce a bread that would wholly or partially supersede oats, which seem to be comparatively precious on the continent. Buck-wheat, rye, barley, wheat, and potatoes have been tried in varying proportion, and, according to several accounts, with success. But it does not appear very distinctly why these articles should be converted into bread, which is a costly process, rather than given raw or boiled. It is indeed alleged that some of the constituent principles are not digestible until they have undergone fermentation; and it may be so, but no proof is shown that I have seen.

Linseed in small quantities, either whole or ground, raw or boiled, is sometimes given to sick horses. It is too nutritious for a fevered horse, but is very useful for a cough, and it makes the skin loose and the coat glossy. Half a pint may be mixed with the usual feed every night. For a cough it should be boiled, and given in a bran mash, to which two or three ounces of coarse sugar may be added.

Oil cake, ground and given in the boiled meat, when not very rich, consisting chiefly or entirely of roots, is much stronger than bran, and stronger, perhaps, than oatmeal seeds. Two to four pounds per day is the usual allowance. It makes the hair glossy. Horses seem to tire of it soon, but the farmer will find it useful for helping his horses through the winter.

Hempseed used to be given to racers a few days before running. It was supposed to be invigorating and "good for the wind." I believe it is not now employed, except occasionally to stallions during the travelling season. Some give four or six ounces every night.

Sugar.—Mr. Black, veterinary surgeon of the 14th Light Dragoons, informed me that sugar was tried as an article of horse food during the Peninsular war. The experiment was made at the Brighton depot upon ten horses, during a period of three months. Each got eight pounds per day, at four rations. They took to it very readily, and it was remarked that their coats became fine, smooth, and glossy. They got no corn, and only seven pounds of hay, instead of the ordinary allowance, which is twelve pounds. The sugar seemed to supply the place of corn so well, that it would probably have been given to the horses abroad. But peace came, and the circumstances which rendered the use of sugar for corn desirable, ceased. The horses returned to their usual diet; but several of those that were the subjects of this experiment became crib-biters.

That the sugar might not be appropriated to other purposes, it was slightly scented with asafœtida, which did not produce any apparent effect upon the horses.

"*Fruit*, as gourds and sweet potatoes in America; figs and chestnuts in Spain and Italy; apples in some parts of France; and numerous other fructified exotics, are occasionally employed as food for horses."* *Horse chestnuts*, it is said, "would probably form a valuable article of medicinal food for horses. In Turkey the nuts are ground, and mixed with other food; and they are regarded as a remedy for broken wind, and serviceable to horses troubled with coughs."† *Haws*, the fruit of the hawthorn, have been employed by West of Hampshire, as an article of food for farm-horses, with what profit I have not learned. "The people of Medjid feed their horses regularly on dates. At Deyrach, in the country of the Flassæ, dates are mixed with the clover. Barley, however, is the most usual food in all parts of Arabia."‡

Flesh.—The structure of the horse does not seem adapted to the assimilation of animal food. But some seem to have no dislike to it; and it is well to know that it may to a certain extent, supply the place of corn. I have seen them lick blood repeatedly and greedily. Bracy Clarke says he has "seen a well-attested account in a magazine, of a colt that was in the habit of visiting a pantry window which looked into his paddock, and of stealing and eating mutton, beef, veal, and poultry. Pork he seemed to reject. In the East Indies, meat boiled to rags, to which is added some kinds of grain and butter, is made into balls and forced down the horse's throat.—*Carpenter's Introduc. to the Wars of India.* Also sheep's heads during a campaign are boiled for horses in that country."§

"While at the stable of Mr. Mellings, of Wakefield, the groom would let me see a flesh-eating horse. He brought about a pound of roasted beef and as much raw bacon, which he warmed. I took away the horse, while the groom put the meat in one corner of the manger, and a feed of oats in the other. I put in the horse and directed his nose to the corn, but he darted from that to the bacon, which he greedily devoured. He then ate his corn. The groom said this horse would finish the bone of a leg of mutton in a few minutes, and that roasted meat was his favorite dish."‖ The wealthy people of Medjid frequently give flesh to their horses, raw as well as boiled, together with the offals of the table. "I knew a man at Hamah in Syria, who assured me that he had often given his horses washed meat after a journey, to make them endure it with greater facility. The same person related to me, that, apprehensive of the governor of the town taking a liking to his favorite horse, he fed it for a fortnight entirely on roasted pork, which raised its mettle to such a height that it became absolutely unmanageable, and could no longer be an object of desire to the governor."¶

Fish.—"In Iceland, it is stated by Buffon, that dried fish is made the food of horses; and my friend William Bullock, senior, lately informed me he saw them in the same practice in Norway."**

Eggs are sometimes given to stallions in the travelling season, for exciting desire, and to other

* Blaine's Vet. Outlines, p. 94. London, 1832.

† Comp. Grazier, p. 629. 1833.

‡ Past and present state of the English racer. Hookham, 1836.

§ Clarke, Pharmacop. Equina. Lond, 1833.

‖ The Veterinarian, Vol. v. p. 25. Letter from Mr. Garland, V. S. Wakefield.

¶ Past and present state of the English racer. 1836.

** B. Clarke, Pharm. Eq.

horses for producing a smooth coat. They are quite useless for either purpose, at least as they are given, only one or two at a time. If they are to do any good the horse would need a dozen of them or thereabouts, I should think. One or two, however, can have no good effect. The egg is chipped, *starred* as they call it, all round, and given raw, like a ball.

Several, many horses have been lost by the egg sticking in the throat, and producing suffocation. If eggs must be given, let them be broken and mixed with a mash, or boiled hard and added to the corn. But I see no need for them in any shape.

Milk.—In this country, milk is not used as an article of food for grown-up horses. Occasionally it is given to stallions in the covering season. A mash is made of milk, bran, and oil-cake, ground; and in Ayrshire, whey is frequently given to stallions as a drink. It is supposed to be "amatory food." The Arabs, in traversing the Desert are said to give their horses camels' milk when forage fails. Major Denham, speaking of some horses he met with among the Tiboos, says—"two of them were very handsome, though small; and on remarking their extreme fatness, I was not a little surprised to learn that they were fed entirely on camel's milk, corn being too scarce and valuable an article for the Tiboos to spare them. They drink it both sweet and sour; and animals in higher condition I scarcely ever saw."*

Mares' Milk.—For the first six months of the young horse's life, his principal food is mare's milk. He begins to eat much sooner, but few are entirely weaned before this time. Farm mares are usually put to gentle work two or three weeks after parturition. Her work should be moderate and her diet substantial. She is often treated as if work could have no influence on the milk. When she has much to do, the milk is neither good nor abundant, and the foal is half-starved. The foal is sometimes permitted to follow his dam to the field, where he may occasionally suckle her. This renders the foal familiar, and at an early age reconciles him to subjection, and it prevents engorgement of the udder. Bad weather, or the nature of the mare's work, may forbid the practice. When the mare comes home, the foal is put to suck her. In some places, the milk is previously stripped on the ground, and the udder bathed with cold water, or vinegar and water. This is not necessary. It is supposed that the milk is injured and pernicious when the mare is over-heated; but, in the first place, her work should never be so severe as to over-heat her; and, in the second, the milk is not apparently altered when she is. Hard work will diminish the quantity of milk, and render it less nutritious, but it will do no more. If the foal be withheld till the udder be gorged and distended, a little inflammation will take place, and the milk will be bad. In such case it is proper to draw off a portion before the foal is put to it; and it may also be proper to bathe the udder with cold water. But to empty it or to bathe it merely because the mare has been perspiring, is absurd; and to neglect both mare and foal till the udder needs such treatment betrays very bad management.

* Denham's Travels in Africa.

THE HOLLOW HORN.—A FAIR OFFER.

From the Wayne Sentinel.

Within a few days we have heard several farmers from the surrounding country complain that their cattle have the hollow horn. We have had a little experience in the management of cattle, and know something about this "hollow horn," and we are satisfied that it is nothing more nor less than an attendant, a sort of hanger-on, of that worst of all diseases among cattle, the *hollow belly*. We know men who have cattle that during the whole winter have been exposed to the "pitiless peltings" of the storms, with a snowdrift or an ice cake for a bed, and with nothing but a scanty pittance of prairie hay or musty straw for food, and who now wonder that their cattle have the hollow horn! The wonder should be that they have any cattle living.

We will make the following proposals to all those owning cattle. Keep them under shelter during the storms and cold weather of next winter. A hovel, built of logs and covered with coarse hay or straw, standing in a dry place, is sufficient for this. Salt them twice a week regularly; give them a sufficiency of wholesome provender, and water at all times, and each of them a mess of potatoes or turnips at least two or three times a week. Keep your working cattle shod, and if you work them hard, feed and nurse them accordingly. Do not beat them; never let them stand in the cold longer than is absolutely necessary; particularly when you drive them to town with a load of grain or wood, or for any other purpose; do not let them stand in the street hungry and shivering, hour after hour, while you are in a grocery drinking and carousing. Follow these directions fairly, according to their true intent and meaning, and in the spring we will engage to pay for all the damage you have sustained by the "hollow horn."

HELIANTHUS, OR SUN-FLOWER PLANT.

From the Madisonian.

We presume that it is not generally known that this plant, which is often regarded as a worse than useless cumberer of the ground, is cultivated extensively in some parts of the United States, and turned to a very valuable account in a variety of ways. The versatility of its powers, so to speak, are even greater than the morus multicaulis. We have before us a letter from a firm in Pennsylvania which gives us some interesting facts, which we think are worthy of publicity.

The oil derived from the sun-flower seed is pretty well known. Its excellence for fancy painting and druggist use is said to be confirmed, and we are even told that it is equal, if not superior to almond or olive oil for table use. One acre of ground will produce from forty to fifty bushels of seed, and sometimes much more. Good seed will produce a gallon of oil to the bushel, and the oil has been sold at $1 50 per gallon when flaxseed oil stood at 90 cents. The refuse after the oil is expressed, is said to be a valuable food for cattle.

The leaf is manufactured into cigars of a mild pleasant flavor, possessing, as it is said, powerful pectoral properties, highly commended by physicians in many diseases of the chest. The leaves,

properly cured, will bring from five to fifteen cents per pound.

The stalk, when stripped of the leaf and seed, may be burnt, and a superior alkali made from the ashes.

The comb of the seed, or properly the filaments of the flower, is excellent feed for cattle or hogs.

The helianthus is cultivated in the vicinity of York, (Penn.) and a gentleman in 1837, cultivated one hundred acres.

Extract from the "Essay on Calcareous Manures."

RECAPITULATION OF THE EFFECTS OF CALCAREOUS MANURES, AND DIRECTIONS FOR THEIR MOST PROFITABLE APPLICATION.

Under like circumstances in other respects, the benefit derived from marling will be in proportion to the quantity of vegetable or other putrescent matter given to the soil. It is essential that the cultivation should be mild, and that no grazing be permitted on poor lands. Wherever farm-yard manure is used, the land should be marled heavily, and if the marl is applied first, so much the better. The one manure cannot act by fixing the other, except so far as they are in contact, and both well mixed with the soil.

On *galled* spots, from which all the soil has been washed, and where no plant can live, the application of marl alone is utterly useless. Putrescent manures alone would there have but little effect, unless in great quantity, and would soon be all lost. But marl and putrescent matter together serve to form a new soil, and thus both are brought into useful action; the marl is made active, and the putrescent manure permanent. The only perfect cures that I have been able to make, at one operation, of galls produced upon a barren subsoil, were by applying a heavy dressing of both calcareous and putrescent manures together; and this method may be relied on as certainly effectual. But though a fertile soil may thus be created, and fixed durably on galls otherwise irreclaimable, the cost will generally exceed the value of the land recovered, from the great quantity of putrescent matter required. Much of our acid hilly land has been deprived, by washing, of a considerabe portion of its natural soil, though not yet made entirely barren. The foregoing remarks equally apply to this kind of land, to the extent that its soil has been carried off. It will be profitable to apply marl to such land--but its effect will be diminished, in proportion to the previous removal of the soil. Calcareous soils are much less apt to wash than other kinds, from the difference of texture. When a field that has been injured by washing is marled, within a few years after many of the old gulleys will begin to produce vegetation, and show a soil gradually forming from the dead vegetables brought there by winds and rains, although no means should have been used to aid this operation.

The effect of marling will be much lessened by the soil being kept under exhausting cultivation. Such were the circumstances under which we may suppose that marl was tried and abandoned many years ago, in the case referred to in page 37. Proceeding upon the false supposition that marl was to enrich by direct action, it is most probable that it was applied to some of the poorest, and most exhausted land, for the purpose of giving the manure a "fair trial." The disappointment of such ill-founded expectations, was a sufficient reason for the experiment not being repeated, or being scarcely ever referred to again, except as evidence of the worthlessness of marl. Yet with proper views of the action of this manure, this experiment might at first have as well proved the early efficacy and value of marl, as it now does its durability.

When acid soils are equally poor, the increase of the first crop from marling will be greater on sandy, than on clay soils; though the latter, by heavier dressings and longer time, may ultimately become the best land, at least for wheat and for grass. The more acid the growth of any soil is, or would be, if suffered to stand, the more increase of crop may be expected from marl; which is directly the reverse of the effects of putrescent manures. The increase of the first crop on worn acid soil, I have never known under fifty per cent., and more often is as much as one hundred—and the improvement continues to increase, under mild tillage, to three or four times the original product of the land. [See Exp. 11, page 46, and Exp. 4 and 6.] In this, and other general statements of effects, I suppose the land to bear not more than two grain crops in four years, and not to be subjected to grazing—and that a sufficient cover of marl has been laid on for use, and not enough to cause disease. It is true, that it is difficult, if not impossible, to fix that proper medium, varying as it may on every change of soil, of situation, and of the kind of marl. But whatever error may be made in the proportion of marl applied, let it be on the side of light dressing, (except where putrescent manures are also laid on, or designed to be laid on before the next course of crops begins) —and if less increase of crops is gained to the acre, the cost and labor of marling will be lessened in a still greater proportion. If, after tillage has served to mix the marl well with the soil, sorrel should still show to any extent, it will sufficiently indicate that not enough marl had been applied, and that it may be added to, safely and profitably. If the nature of the soil, its condition and treatment, and the strength of the marl, all were known, it would be easy to direct the amount of a suitable dressing; but without knowing these circumstances, it will be safest to give two hundred and fifty, or three hundred bushels to the acre of worn acid soils, and at least twice as much to newly cleared, or well manured land. Besides avoiding danger, it is more profitable to marl lightly at first on weak lands. If a farmer can carry out only ten thousand bushels of marl in a year, he will derive more product, and confer a greater amount of improvement, by spreading it over forty acres of the land intended for his next crop, than on twenty, though the increase to the acre would probably be greatest in the latter case. By the lighter dressing, the land of the whole farm will be marled, and be storing up vegetable matter for its progressive improvement, in half the time that it could be marled at double the rate.

The greater part of the calcareous earth applied at one time cannot begin to act as manure before several years have passed, owing to the coarse state of many of the shells, and the want of thoroughly mixing them with the soil. Therefore, if

enough marl is applied to obtain its full effect on the first course of crops, there will certainly be too much afterwards.

Perhaps the greatest profit to be derived from marling, though not the most apparent, is on such soils as are full of wasting vegetable matter. Here the effect is mostly preservative, and the benefit and profit may be great, even though the increase of crop may be very inconsiderable. Putrescent manure laid on any acid soil, or the natural vegetable cover of those newly cleared, without marl, would soon be lost, and the crops reduced to one half, or less. But when marl is previously applied, this waste of fertility is prevented; and the estimate of benefit should not only include the actual increase of crop caused by marling, but as much more as the amount of the diminution, which would otherwise have followed. Every intended clearing of woodland, and especially of that under a second growth of pines, ought to be marled before cutting down—and it will be still better, if it can be done several years before. If the application is delayed until the new land is brought under cultivation, though much putrescent matter will be saved, still more must be wasted. By using marl some years before obtaining a crop from it, as many more successive growths of leaves will be converted to useful manure, and fixed in the soil—and the increased fertility will more than compensate for the delay. By such an operation, we make a loan to the soil, with a distant time for payment, but on ample security, and at a high rate of compound interest.

Some experienced cultivators have believed that the most profitable way to manage pine old fields when cleared of their second growth, was to cultivate them every year, until worn out—because, as they said, such land would not last much longer, no matter how mildly treated. This opinion, which seems so absurd, and in opposition to all the received rules for good husbandry, is considerably supported by the properties which are here ascribed to such soils. When these lands are first cut down, an immense quantity of vegetable matter is accumulated on the surface—which, notwithstanding its accompanying acid quality, is capable of making two or three crops nearly or quite as good as the land was ever able to bring. But as the soil has no power to retain this vegetable matter, it will begin rapidly to decompose and waste, as soon as exposed to the sun, and will be lost, except so much as is caught while escaping, by the roots of growing crops. The previous application of marl, would make it profitable in these, as well as other cases, to adopt a mild and meliorating course of tillage.

Less improvement will be obtained by marling worn soils of the kind called "free light land," than other acid soils which originally produced much more sparingly. The early productiveness of this kind of soil, and its rapid exhaustion by cultivation, at first view seem to contradict the opinion, that durability and the ease of improving by putrescent manures are proportioned to the natural fertility of the soil. But a full consideration of circumstances will show that no such contradiction exists.

In defining the term *natural fertility*, it was stated that it should not be measured by the earliest products of a new soil, which might be either much reduced, or increased, by temporary causes. The early fertility of free light land is so rapidly destroyed, as to take away all ground for considering it as fixed in, and belonging to the soil. It is like the effect of dung on the same land afterwards, which throws out all its effect in the course of one or two years, and leaves the land as poor as before. But still it needs explanation why so much productiveness can at first be exerted by any acid soil, as in those described in the 14th experiment. The cause may be found in the following reasons. These soils, and also their subsoils, are principally composed of coarse sand, which makes them of more open texture than best suits pine, and (when rich enough) more favorable to other trees, the leaves of which have no natural acid, and therefore decompose more readily. As fast as the fallen leaves rot, they are of course exposed to waste—but the rains convey much of their finer parts down into the open soil, where the less degree of heat retards their final decomposition. Still this enriching matter is liable to be further decomposed and to final waste: but though continually wasting, it is also continually added to by the rotting leaves above. The shelter of the upper coat of unrotted leaves, and the shade of the trees, cause the first, as well as the last stages of decomposition to proceed slowly, and to favor the mechanical process of the products being mixed with the soil. But there is no chemical union of the vegetable matter with the soil. When the land is cleared, and opened by the plough, the decomposition of all the accumulated vegetable matter is hastened by the increased action of sun and air, and in a short time converts every thing into food for plants. This abundant supply suffices, to produce two or three fine crops. But now, the most fruitful source of vegetable matter has been cut off—and the soil is kept so heated (by its open texture) as to be unable to hold enriching matters, even if they were furnished. The land soon becomes poor, and must remain so, as long as these causes operate, even though cultivated under the mildest rotation. When the transient fertility of such a soil is gone, its acid qualities (which were before concealed in some measure by so much enriching matter,) become evident. Sorrel and broom grass cover the land—and if allowed to stand, pines will take complete possession, because the poverty of the soil leaves them no rival to contend with.

Marling deepens cultivated sandy soils, even lower than the plough may have penetrated. This was an unexpected result, and when first observed, seemed scarcely credible. But this effect also is a consequence of the power of calcareous earth to fix manures. As stated in the foregoing paragraph, the soluble and finely divided particles of rotted vegetable matters are carried by the rains below the soil; but as there is no calcareous earth there to fix them, they must again rise in a gaseous form, after their last decomposition, unless previously taken up by growing plants. But after the soil is marled, calcareous as well as putrescent matter is carried down by the rains as far as the soil is open enough for them to pass. This will always be as deep as the ploughing has been, and in loose earth, somewhat deeper—and the chemical union formed between these different substances serves to fix both, and thus increases the depth of the soil. This effect is very different from the deepening of the soil by letting the plough run into the barren subsoil. If by this mechani-

cal process, a soil of only three inches is increased to five, as much as it gains in depth, it looses in richness. But when a marled soil is deepened gradually, its dark color and apparent richness is increased, as well as its depth. Formerly single-horse ploughs were used to break all my acid soils, and even they would often turn up subsoil. The average depth of soil on old land did not exceed three inches, nor two on the newly cleared. Even before marling was commenced, my ploughing had generally sunk into the subsoil—and since 1825, most of this originally thin soil has required three mules, or two good horses to a plough, to break the necessary depth. The soil is now from five to seven inches deep generally, from the joint operation of marling and deepening the ploughing a little in the beginning of every course of crops.

How destructive to the power of soil this depth of ploughing would have been, without marling, may be inferred from the continued decrease of the crop, through four successive courses of a very mild rotation, on the spot kept without marl in experiment 10. Yet the depth of ploughing there did not exceed six inches, and depths of nine and even twelve inches were tried, without injury, on parts of the adjacent marled land.

Besides the general benefit which marling causes equally to all crops, by making the soils they grow on richer and more productive, there are other particular benefits which affect some plants more than others. For example, marling serves to make soils warmer, and thereby hastens the ripening of every crop, more than would take place on the like soils, if made equally productive by other than calcareous manures. This quality of marled land is highly important to cotton, as our summers are not long enough to mature the later pods. Wheat also derives especial benefit from the warmth thus added to the soil: it is enabled better to withstand the severe cold of winter; and even the short time by which its ripening is forwarded by marling, serves very much to lessen the danger of the crop from *rust*. Wheat also profits by the absorbent power of marled land, (by which sands acquire, to some extent, the best qualities of clays,) though less so than clover and other grasses that flourish best in a moist climate. Indian corn does not need more time for maturing than our summers afford (except on the poorest land,) and can sustain much drought without injury; and therefore is less aided by these qualities of marled land. Most (if not all) the different plants of the pea kind, and all the varieties of clover, derive such remarkable benefit from marling, that it must be caused by some peculiarity in the nature of those plants. Perhaps a large portion of calcareous earth is necessary as part of their food, to aid in the formation of the substance of plants as well as to preserve their healthy existence.

On acid soils without manure it is scarcely possible to raise red clover—and even with every aid from putrescent manure, the crop will be both uncertain and unprofitable. The recommendation of this grass as part of a general system of cultivation and improvement, by the author of "*Arator*," is sufficient to prove that his improvements were made on soils far better than such as are general. Almost every zealous cultivator and improver (in prospect) of acid soil has been induced to attempt clover culture, either by the recommendations of writers on this grass, or by the success witnessed on better constituted soils elsewhere. The utmost that has been gained by any of these numerous efforts, has been sometimes to obtain one, or at most two mowings, of middling clover, on some very rich lot, which had been prepared in the most perfect manner by the previous cultivation of tobacco. Even in such situations, this degree of success could only be obtained by the concurrence of the most favorable seasons. Severe cold, and sudden alternations of temperature in winter and spring, and the spells of hot and dry weather which we usually have in summer, were alike fatal to the growth of clover, on so unfriendly a soil. The few examples of partial success never served to pay for the more frequent failures and losses; and a few years' trial would convince the most ardent, or the most obstinate advocate for the clover husbandry, that is introduction on the great body of land in Lower Virginia, was absolutely impossible. Still the general failure was by common consent attributed to any thing but the true cause. There was always some reason offered for each particular failure, sufficient to produce it, and but for which (it was supposed) a crop might have been raised. Either the young plants were killed by freezing soon after first springing from the seed—or a drought occurred when the crop was most exposed to the sun, by reaping the sheltering crop of wheat—or native and hardy weeds overran the crop—and all such disasters, were supposed to be increased in force, and rendered generally fatal, by our sand soil, and hot and dry summers. But after the true evil, *the acid nature of the soil*, is removed by marling, clover ceases to be a feeble exotic. It is at once naturalized on our soil, and is able to contend with rival plants, and to undergo every severity and change of season, as safely as our crops of corn and wheat—and offers to our acceptance the fruition of those hopes of profit and improvement from clover, with which heretofore we have only been deluded.

After much waste of seed and labor, and years of disappointed efforts, I abandoned clover as utterly hopeless. But after marling the fields on which the raising of clover had been vainly attempted, there arose from its scattered and feeble remains, a growth which served to prove that its cultivation would then be safe and profitable. It has since been gradually extended nearly over all the fields. It will stand well, and maintain a healthy growth on the poorest marled land: but the crop is too scanty for mowing, or perhaps for profit of any kind, on most sandy soils, unless aided by gypsum. Newly cleared lands yield better clover than the old, though the latter may produce as heavy grain crops. The remarkable crops of clover raised on very poor clay soils, after marling, have been already described. This grass, even without gypsum, and still more if aided by that manure, may add greatly to the improving power of marl: but it will do more harm than service, if we greedily take from the soil too large a share of the supply of putrescent matter which it affords.

Some other plants, less welcome than clover, are equally favored by marling. Greensward, blue grass, wire grass, and partridge pea, will soon increase so as to be not less impediments to tillage, than evidences of an entire change in the character and power of the soil.

If the foregoing views may be confided in, the

general course most proper to pursue in using calcareous manures may thence be deduced without difficulty. But as I have found, since the publication of the first edition of this essay, that many persons still ask for more special directions to guide their operations, and as all such difficulties may not be entirely obviated even by the more full details now given, I will here add the following directions, at the risk of their being considered superfluous. These directions, like all the foregoing reasoning, may apply generally, if not entirely, to the use of all kinds of calcareous manures, and to soils in various regions: but to avoid too wide a range, I shall consider them as applied particularly to the poor lands, and to the fossil shells, or marl, of the tide-water region, and addressed to persons who are just commencing their improvements.

As the cheapest mode of furnishing vegetable matter to land intended to be marled and cultivated, no grazing should be permitted. It is best to put the marl on the grass previous to ploughing the field for corn, as the early effect of this manure is greatest when it has been placed in contact with the vegetable matter. But this advantage is not so great as to induce the ploughing to be delayed, or to stop the marling after that operation. When the marl is spread upon the ploughed surface, it can be better mixed with the soil, by the cultivation of the crop—and this advantage in some measure compensates for the loss of that which would have been obtained from an earlier application on the sod. If marl is ploughed in, it should not be so deeply as to prevent its being mixed with the soil, speedily and thoroughly, by the subsequent tillage. To make sure of equal distribution, the marl should be spread regularly over the surface. From neglect in this respect, a dressing of marl is often too thin in many places to have its proper effect, and in others, so thick as to prove injurious. Hence it is that marl-burnt stalks of corn, and tufts of sorrel are sometimes seen on the same acre.

After the first year, the farmer may generally marl fast enough to keep ahead of his cultivation: and even though he should reduce the space of his tillage to one-half, it will be best for him not to put an acre in corn without its being marled. Fifty acres can generally be both marled and tilled, as cheaply as one hundred can be tilled without marling; and the fifty will produce as much as the hundred, in the first course of crops, and much more afterwards.

That rotation of crops which gives most vegetable matter to the soil, is best to aid the effect of marl recently applied. The four-shift rotation is convenient in this respect, because two or three years of rest may be given in each course of the rotation at first, upon the poorest land; and the number of exhausting crops may be increased first to two, then to three in the rotation, as the soil advances to its highest state of productiveness.

After marling, clover should be sown, and gypsum on the clover. On poor, though marled land, of course only a poor growth of clover can be expected; but wherever other manures are given, and especially if gypsum is found to act well, the crop of clover becomes a most important part of the improvement by marling. Without clover, and without returning the greater part of its product to the soil, the great value of marling will not be seen. A small proportion of the clover may be used as food for cattle; and in a few years this small share will far exceed all the grass that the fields furnished before marling, and the limitation of grazing. What is at first considered as lessening the food of grazing stock, and their products, within a few years becomes the source of a far more abundant supply.

During the first few years of marling, but little attention can (or ought to) be given to making putrescent manures, because the soil much more needs calcareous manure—and three acres may generally be supplied with the latter, as cheaply as one with the former. But putrescent manures cannot any where be used to so much advantage, as upon poor soils made calcareous, and no farmer can make and apply vegetable matter as manure to greater profit than he who has marled his poor fields, and can then withdraw his labor from applying the more to the less profitable manure. After the farm has been marled over at the light rate recommended at first, every effort should be made to accumulate and apply vegetable manures, and with their gradual extension over the fields a second application of marl may be made, making the whole quantity in both the first and second marling, 500 or 600 bushels to the acre, or even more, which would have been hurtful if given at first, but which will now be not only harmless, but necessary to fix and retain so much putrescent and nutritive matter in the soil.

If the course here advised is pursued on poor and acid soils, the products will be generally doubled in the first course of the rotation—often in the first crop immediately following the marling: and the original product may be expected to be tripled by the third return of the rotation. This will be from merely applying marl in sufficient (and not excessive) quantities, and giving the land two years' rest in four, without grazing. But with the aid of farm-yard and other putrescent manures, and of clover, both of which should be largely in use during the second course of crops, still greater returns may be obtained.

OBSERVATIONS ON THE EARLIEST MARLED DISTRICT OF PRINCE GEORGE COUNTY,

Introductory to Queries and Answers in regard to the marling there.

BY THE EDITOR.

The portion of Prince George county to which the following observations apply, is of very uniform character. It lies between Powell's creek and Bailey's creek, which empty into James river about 8 miles apart. The head-stream of Powell's creek, the Birchen swamp, or rather its eastern slope, may be considered as the eastern boundary, and the western is the Branchester mill stream, or eastern source of Bailey's creek. A line connecting the head springs of these two streams is the southern limit. James river forms the northern. The space included is from 7 to 9 miles across in both diameters.

There are numerous smaller streams and rivulets, besides the two already named; and they are generally bordered by strips of alluvial low-ground, of sizes proportioned to the streams, and varying

from 10 yards, or even less, to 80, or rarely 100, where widest. These lands are sandy, but originally very rich; and, excepting some of the river banks and borders, were the only really rich land in this district, or in the county. From these narrow low-grounds, the land rises in hill-sides, generally not too steep for the plough, to the summit ridges, which are 80 or 100 feet higher than the streams. The highest, or ridge land, was originally poor and acid soil, bearing pines principally, with some oak, and whortleberry bushes. The slopes between these extremes of elevation form the greater part of all the surface. They are lighter, and originally much richer than the ridges, though far from being good, and still less are they durable land. This kind is generally what was called "free light land."

The table land generally approaches the river very nearly without much diminution of height, being 80 to 100 feet above the tide-water. But the otherwise general level is broken by many deep and narrow valleys, or glens, with very precipitous sides, and which extend backward from the river, rarely more than half a mile, and generally not so far. Just as far as these deep natural ravines extend, was the land originally of much better quality than beyond, where the soil is that of the poor ridges. Within the extent of the ravines, the soil is usually better as the river is approached; and, for a small space, near the extremity of the table land, the original quality was very fertile.

A still more striking peculiarity of this district, and precisely limited by the two creeks, is the space between the table land and the river. This strip, varying in width from 20, or less, to more than 150 yards, and more than 10 miles in its circuitous length, may be designated as the *broken banks* of the river. This strip is a succession of irregular natural terraces, descending from the table land to the river, by several precipitous hill-sides, between which the narrow strips of land are either level, or rising in the direction opposite to that of the general declivity.

This strip of land has generally been long cleared, and greatly exhausted. A part on Coggins' Point farm was cleared by myself, and a narrow strip still remains under its original forest growth; and both, as well as smaller spots elsewhere, show great fertility of soil. But though this must have been the general character of the whole, still, even in the virgin land, there were frequent and sudden transitions from one kind of soil to another the most different in character. The soil generally is a rich, dark, sandy, and sometimes gravelly loam; but, from this, a distance of ten yards will often bring the observer to a barren sand, sometimes silicious and sometimes calcareous, or barren clay, or to naked shell marl, as barren as either. These sudden changes were to me for a long time incomprehensible, as well as the singular shape of the surface, until both were explained by later observation. Not more than 12 years ago, there occurred on the adjacent higher ground of the Tarbay farm, two cases of "land-slips" on subsidence and moving of the surface, which clearly showed that all the extent of broken banks had been formed in remote times in the same manner. Hence the broken strata, and the perpendicular termination of each, and every stratum being brought somewhere to the surface.

Under the whole of this curious strip lies shell marl, of a dingy, yellowish-white color, and the shells, or their fragments, mixed with a large proportion of coarse sand. The beds are generally soft and easy to dig, owing to the great quantities of sand. Under this marl throughout lies a lower bed, of unknown depth, of what was originally similar marl, but which now has remaining not a particle of shell, or calcareous matter. This is the great body of what I called "gypseous earth," in my account of it at page 207 of Vol. I. of Farmers' Register, and which is called the "green-sand" formation, in the reports of the geological survey since made.

These remarkable broken banks, (far more valuable than all the *unbroken banks*, if any deserve now to be so considered,) though requiring this notice because of their singular character, form but a very small portion of the surface of this district; and the good table lands adjoining make not much more.

It would be difficult to conceive any connexion between the existence of the deep and steep-sided glens which stretch back from the river, and the better quality of the close adjacent table land; yet they are always found together. In speaking of one of the farms, Tarbay, many years ago, I said it was a great pity that the otherwise level highland should be so much cut up by the deep river ravines. An old and observant farmer, to whom I addressed the remark, answered that, on the contrary, he thought it was to be regretted that the ravines did not extend back much farther; as it was certain that the good land ceased with them, and that all from immediately beyond them was totally worthless.

The sides of these glens present the most precipitous natural surface to be found in the lower country; and in that respect are more like mountain lands than any thing below. They cut through the different horizontal strata, and of course present sections of soil of various textures and qualities. But all the surface is fertile at first under cultivation, and continues so until the soil is washed off; and before clearing, the whole of these steep lands were covered with a magnificent forest growth, of different kinds of trees indicative of fertile soil.

But for the existence of these deep ravines, and of the broken banks of the river, both of which have been produced subsequently to the general formation, the high river lands might generally be termed level. And both in that view, and in the actual variation from the original level, these lands offer a very strong contrast to the surface of all others back from the river. The latter are no where level, except on the summit ridges, and in the narrow low-grounds. The much larger proportion of intervening lands, and which I have above and elsewhere called slopes, are gently, though variously, inclined, and are rarely too steep to be subjected to the plough, but steep enough to be greatly and generally washed, deprived of soil, and gullied, by the abuse of tillage. When first cleared, nearly all these slopes, and of course much the greater part of the whole district under consideration, was what was called in common parlance "good land;" that is, it was productive, (comparatively, at least,) for a few years. But nearly all soon lost this early value, and the land remained poor afterwards, and hopeless of improve-

ment, until the discovery and use of its now great means for improvement, shell marl.*

Shell marl is visible on some low part of almost every farm in this region, and on all the tributary streams of Powell's creek. Yet all the land surrounding and drained by the next large tide-water creek below (Ward's creek) is believed to be destitute of marl. The same absence of marl is in the basin of the Appomattox river, which is the next tributary of James river above Bailey's creek. Again, on the several streams which rise in this county south of the creek spoken of, and which flow to Blackwater river, and thence to the waters of North Carolina, marl has recently been found in abundance, though not known to exist there, near the surface, or where accessible, until within the few last years. From the different character of the surface of the land on these waters, the greater extent of poor ridge, and of level and yet unexhausted, though naturally poor land, this region is greatly more fitted to be improved by marl than the district which is the particular subject of consideration here. It is very certain, that the originally poor and acid ridge land is more improved by marling, and yields more profit from that improvement, than the "free light land," or slopes of much better original rate of productiveness.

When I first became a proprietor and cultivator in this neighborhood, (where also I had been born and reared,) nearly all the slopes had been cleared, and worn down to a product sometimes of ten bushels of corn per acre, or three or four of wheat, and more generally of five bushels of corn, and no wheat. I speak of land still kept in cultivation; for much had been turned out, as still more worthless, to grow up again in pines. The little better land off the river consisted of a small quantity of manured tobacco lots around the houses, perhaps rather more of the narrow low grounds or small streams, and annual clearings of new ground, of slope land, as long as any such wood-land was left to be cut down. The level ridge land was counted as worthless, and was not cleared except where there was no better. A very high comparative estimate of value was placed on these narrow low-grounds, because they were almost the only rich natural land. I remember to have heard the Bonaccord farm spoken of frequently in former times as one of the best inland tracts in the county, because "it had such beautiful low-grounds." The farm, of more than 400 acres of arable land, then had, as part of it, about 50 acres of the Birchen swamp, of the general quality before described, rich, but sandy, subject to overflow by every heavy rain, and altogether badly drained and cultivated, and very uncertain in product. Still, this small proportion of better soil gave character and reputation to the whole farm, and compensated, in common opinion, for the great poverty of 500 to 600 acres of high-land. Now, and for some years back, the high-land is generally marled; and so superior is its value to the formerly highly prized low-grounds, that the proprietors would gladly have the low-grounds substituted by as much of the poorest ridge land, if convenient to be marled. Yet the low-grounds are better drained and better tilled than formerly, and, therefore, doubtless of greater productive value.

Such, for the greater part, were all the farms of this neighborhood. Those on the river had more or less of the richer river banks, both the broken and the high. Some, both on and off the river, had more or less of the narrow low-grounds formerly rated so high, and which now are almost deemed an objection to any property. But the greater part, and sometimes nearly the whole of every farm, was of the mean and worn high-land above described.

It was under these very disadvantageous circumstances, that in January 1818 the use of marl was first commenced successfully by myself, and thereafter continued regularly, on Coggins' Point farm, my then residence and sole property. At first, general doubt, or incredulity, as to the value of the effects, caused other persons to be slow and hesitating in following my example; and, even when they became sufficiently confident, ignorance of the mode of operation of the manure, and the consequent want of judgment in its use, caused the practice to be but little beneficial. Hence, nearly all the early practice was more or less wrong, and, in part, either unproductive, or injurious; and it is in the labors of the late beginners, (late because either not before possessing the land, or not having discovered marl earlier thereon,) that the most rapid progress and best of early results are to be seen. Still, every one's practice is defective; and not one, (and I except not myself,) has pursued fully the proper course to gain the best profits from marling. Hence, the evidence now to be drawn, and such as will be presented, from the earliest practice, and that which only can show the durable effects of marl, is by no means so strong as will hereafter be the experience of persons who have more recently begun the use, and in a more judicious manner, became better informed as to the benefits, and warned, by the errors and losses of the early operators, against following their bad example.

But the general injudicious procedure of the early marlers is not to be wondered at. In truth, there was not, and is not yet, a single good farmer in the whole district. There are, indeed, a large proportion of the proprietors who, since they began to marl, have greatly improved their land, and greatly increased their income and property. But still there is seen every where, without exception, want of economy, of skill and management in practice, and want of general knowledge of, or regard to, the true principles of agriculture.

Such was the land, and such are the proprietors whose practice and results in regard to marling are set forth in the answers to the queries which will follow. And this general statement will perhaps suffice to show clearly, even to those who have no personal acquaintance with the land and its circumstances, that the true estimate of the value of marl as manure, and of the intrinsic value of land to which marl can be easily applied, are not to be measured or limited by the amount of effects produced and now remaining in this district, or by the profits actually secured by the cultivators; great as are the actual improvements, and profits thence derived.

Good and bad land, or fertility and worthlessness of soils, are comparative terms; and to un-

* The peculiarities of the "free light land" of the slopes, as well as of the level summit "ridges," have been also treated of by the writer, at pages 11 and 54 of the 'Essay on Calcareous Manures,' and at page 168 of this volume of Farmers' Register.

derstand their force we should always consider the general circumstances of the region where they are used. Thus, in this formerly very poor region, persons consider and speak of land being highly and profitably improved, by marling, when the actual improved product is not more than 25 bushels of corn, and on some farms is not more than 15 bushels to the acre. To offer such statements of product as evidences of great increased value must seem ridiculous to the cultivators of very fertile lands, who would regard as contemptible even the best of the above rates of product. Thus, for example, in one of the early numbers of the 'Cultivator,' in an article on the culture of corn, by Judge Buel, it is assumed that a crop of 30 bushels of corn per acre is necessary to return the actual expenses of tillage, &c., and therefore that any less product leaves a balance of loss to the farmer. (See Farmers' Register, page 65, vol. ii.) Again, in an article in a Tennessee agricultural paper which has been received since this article was commenced, the writer states and deplores the ruinous exhaustion of the formerly rich lands, which he says are so reduced as to bring no more than 25 bushels of corn to the acre. Now, with all that can be claimed for the present improvement by marl of the poor lands of Prince George, I must frankly admit that generally they have not yet equalled either the 30 bushels, which Judge Buel considered as barely enough to save the cultivator from absolute loss, or the 25 bushels, which in Tennessee is stated as a rate of great impoverishment. Still, even the small products of 15 to 25 bushels of corn, usually made now on the marled lands, are from twice to four times as much as was derived from the same lands before marling.

But let me not be understood as meaning that the usual improved products show the universal or the maximum rate. Some land in this district, previously very poor, (though not the most reduced,) from marling alone, will now produce 35 bushels to the acre; and with proper use of available means, and such judicious and economical farming as would tend to produce the greatest net income, I can entertain no doubt that these marled lands may be generally brought to a product of 50 bushels of corn, or more, to the acre.

To those who would under-rate the value of marl because of the usual low rate of product yet attained, or who would measure the *improved products* here by comparison with those of good farming regions elsewhere, I beg leave to address a few explanations, which will be altogether superfluous to others who well know the former and present state of the land and the farming here.

No person could now examine these or any marled lands, without being convinced of there having been produced great and valuable improvements. Still, for one to give due appreciation to the new condition of things, he ought to know the previous condition of the land and farming, of which I shall here state the principal features, generally and briefly.

Before marling was here commenced, it was not only generally the case that the system of cultivation was exhausting, and the already poor and reduced fields becoming still more unproductive, but I assert, without fear of contradiction, that there was not one individual then enriching his land, taken throughout, in the slightest degree, or increasing on former products, on a general average of his farming, by fertilization. If it be permitted to refer to my own case as the most striking evidence, I claim that there was not wanting on my part, from my beginning labors in 1813, either zeal to improve, present sacrifices for the object, or mildness of the course of cropping to my fields. In these respects, at least, none went farther or did more; and yet after six years of such ill directed but zealous labors, the added enrichment of some parts of my land was not enough to compensate for the washing and other injury to other parts. In fact, new clearings, or new lands otherwise brought under culture, served as the only means of maintaining former products.

At that time, and until about 1820, there was scarcely a proprietor in the district, who would not have been glad to sell his land at less than the common estimate of value, low as that was, and remove to the rich and far west. If any one were an exception, he was held to his land by some other and stronger inducement than the profit he derived from farming, or his expectations of increasing the product. It might have been said that almost every farm was in market; though not actually offered for sale, because of the impossibility of finding purchasers at any prices.

At the present time, every proprietor has marled to a greater or less extent, and with more or less benefit; and even those who have been the least judicious in the process, and therefore have obtained the smallest profits therefrom, are as much as any others convinced of the greater benefits to be obtained by better conduct; and they appreciate their means for improvement, even if they have not yet properly or profitably availed of them. Not a single individual in this district has emigrated to the west after having begun to marl, or who possessed the means of marling. The demand of those who would gladly purchase now exceeds the supply of land for sale; and, indeed, there is no farm or piece of land which can now be brought at its present estimated value; unless it is burdened by some peculiar evil or disadvantage.

In regard to the answers to the queries which will be hereafter submitted, it is proper to observe that the individuals who were applied to were not selected because they had marled the most judiciously and profitably, but because their practice was either among the oldest or the most extensive in the district of which full and correct information could be obtained. In several cases of extensive and profitable marling, the deaths of the improvers, and their successors being unacquainted with the former state of things, have debarred me from obtaining evidence of facts which would have been among the most valuable. Further, in the statements which will be presented, the *oldest* experiments, and practice, which would otherwise be the most valuable and instructive, were generally, indeed in every case, much lessened in effect and profit, by improper treatment. Those persons who have commenced within the last few years, may and generally will do much better than all who preceded them; as they now understand, from the example, and the ill as well as the good management of their predecessors, what cause will lead to the greatest profits, and what to the heaviest losses from marling. And though the present general course of cropping and manage-

ment of each of the individuals is certainly meliorating to the land, in some degree, since and by aid of marling, yet the mildest and best management among them would still be exhausting, if pursued without marling.

It was after almost five years' absence from nearly the whole of my old neighborhood and still longer after an entire change of my former pursuits, that I recently visited and examined the farms of several of my former neighbors, and saw the progress of improvement, which in general is much greater, in these last five years, than in the previous fifteen. The facts which go to show the durability of the improvements by marling, (and which were most sought to be obtained, as being certainly the most important,) will best appear from the answers to the general queries. But a few other facts, not therein embraced, will be here stated in advance.

On Bonaccord, the farm of James B. Cocke, there is a newly cleared field of 100 acres, lying along the eastern side of the public road, and in view of every traveller. But the field does not appear to such advantage from the road, as when entered and more closely examined. This land formerly was (as still is the woodland on the northern, eastern and southern sides) the ordinary poor ridge soil. The field is now covered with a crop of red clover, that is more than knee high, and which would seem to indicate that either 30 bushels of corn to the acre, or 15 to 18 of wheat, might be expected from the land next year. This land, without marl, would not have produced more than 10 to 12 bushels of corn in its best state, to sink in a few crops to less than 8 bushels; not enough wheat at any time to pay for the sowing—and clover could not have lived on it at all.

On Coggins' Point farm, there are still kept unmarled the spots left for experiment, when the surrounding land was marled, in 1820 and 1821, and 1828, and of which the comparative products were reported at pages 41, 43, and 45 of 'Essay on Calcareous Manures.' These spots have been secured from grazing since 1814, and also have had all the benefit, if any, of being rested two years in each rotation of four. They are still wretchedly poor; and appear now, as from the several former measurements made and reported, not to have improved in the least, on account of their long-continued mild treatment.

The farm of Mr. William Wilkins formerly had the reputation of being the poorest in the neighborhood. The industrious young owner commenced marling it in 1835, not long after acquiring possession; and already it presents, throughout its whole length, along which the public road passes, not only a remarkable improvement upon its former very poor state, but a degree of general productiveness that would be striking even to an observer who judged merely of present appearances. Good clover is covering land on which not the feeblest growth could have been produced before marling; and corn, of the first year's growth on pine old field, (the pine trees killed by belting, and all left standing,) now promises a product of 30 bushels to the acre this season. No one has done better than this young man in marling, and increasing profitably the value of his before miserably poor land. One of the main causes of his success has been his general practice of adding leaves raked from the wood land, to all his applications of marl to old land. It deserves mention, also, that there was no marl on this farm, that was worth using; and that Mr. Wilkins has had to contend with the unusual difficulty of having to draw all his marl from the pits of his neighbors. Though his answers to my queries will be given, still his experience, as well as that of some others, is yet too limited for their reports to be of much value in regard to long continued or permanent results, and the main profits, which of course are not to be obtained in the first few years.

The field on the extremity of Jordan's Point, which will form one half of the ground for Dr. Theodrick Bland's answers, in former times was even more noted for its fertility and durability than the land just before mentioned for its poverty and incapability of being improved by any means then known. This celebrated "Point Field" contains 125 acres altogether, and is of the same kind of chocolate colored loam, (commonly called "mulatto land,") and presenting a like surface and elevation, as are found in the best parts of Shirley, Eppes' Island, Westover, Sandy Point, and Brandon. There is not an acre of other land of this kind in all this district of Prince George county. But its former great productiveness and beautiful appearance had been greatly deteriorated by a long continuation of incessant and bad culture. I rode over this field about 12 years ago, and saw it in a worse state than I had supposed such land could have been possibly reduced to; for, in addition to great general exhaustion, the surface was galled, and the mould washed away, leaving the barren subsoil naked, wherever there was the most gentle declivity. Yet the surface is generally what would be termed level, and the undulations are very gentle. When I again viewed this field within a few weeks past, all these before naked galls, as well as the field generally, were covered with a rank growth of clover and weeds, manifesting the restoration every where of fertility as great as that of former time. It is very true, that, to produce such remarkable fertility, Dr. Bland has not only marled well the whole surface, but has supplied putrescent manure very liberally to all the extensive galled surface. But it is scarcely necessary to add, what every practical cultivator knows, that such manure, in any quantity, without the marl, would have served but little purpose for producing and fixing fertility on naked galls, and certainly would have yielded no profit on the outlay.

I will here adduce a few other cases of marling improvements, which have been too recent to furnish such evidences of value and profit as are sought to be obtained by the queries, which are addressed to the conductors of older labors. But, even without waiting for the effects, the facts and circumstances alone of these late and zealous labors serve to place beyond all question the present general estimation of the value of marling in this region.

The farm called High Peak, also termed in derision Poverty Hill, and well known by, and well deserving that name, was formerly and long the residence of a wealthy planter (Col. Peter Epes,) who certainly would have improved it, if industry and any then known means could have availed. After his death, and the removal of his successor, the place was rented out, until no tenant could be found who would even fence a field for its possession; and then the land was left idle, and became grazing common for the neighborhood for some

years more. For a long time it had been in market, but had attracted no buyer. At last, and solely on account of its marl beds, in 1838 it was bought by Mr. Daniel Eppes, (a young man recently of age,) at $4 an acre. By this time nearly all the old fields had grown up in young pines, and required labor in clearing greater than that of marling, and in advance of the latter operation. Still, though thus retarded, the marling, which was commenced in the summer of 1838, had by last spring extended over 120 acres. The force employed for these preparatory operations, as well as for cultivating the land as fast as cleared and marled, was 7 and sometimes only 6 hands, 3 horses, and with the partial aid of 4 oxen.

It should be observed that very few persons have kept any regular and constant marling force, and that the operation ceases on almost every farm from March until in August. None in the neighborhood have yet (August 11th) re-commenced this labor, though it is about to be begun on every farm not yet marled over.

But these and other such industrious exertions of very young men, even in this formerly indolent, careless, and wasteful neighborhood, are not so remarkable as the new-born energy of some others, well stricken in years, and in whom age might be supposed to have chilled the warmth of blood which urges younger men to enterprise, and to new and untried courses. The individuals who will next be mentioned, are near neighbors to each other, and are all old men, though among the youngest marlers in the county. Their location is not within the boundaries of the district to which the previous observations have been confined, though close adjacent, on the nearest lands which drain into Blackwater swamp. Marl was not known to be there available until just before the commencement of its use in the several cases that will now be briefly stated.

The Rev. Thomas B. Bryant, the youngest of these individuals, is 62 years of age. In the autumn of 1836, marl was first found on his land, by boring. He got out enough marl for 15 acres, in time for his next year's crop of corn, and since has increased the space marled to about 200 acres. He has also applied litter raked up in the woods to most of the poorest marled land; and the results, altogether, are already such as to be entirely satisfactory. He is proceeding with zeal and energy.

Mr. Bryant's next neighbor, Mr. Francis Eppes, now 67 years' old, encouraged by his example, also bored for marl, and first found it last September. He went straight to work; and, late as it was, and small as was his working force, he marled 40 acres before planting his now growing crop of corn. The marl was within 3 feet of the surface, and very near and convenient to the field. The demands of his planting and tillage left no labor to spare for marling; but the crop labors being now finished, he is just about to recommence marling for another year's operations.

Mr. Jesse Heath is now between 70 and 80 years old, but hale and hearty as is deserved for the latter end of a life of industry, temperance and good conduct. Before he had hoped to find marl nearer, he was so anxious to use it, as the only means to have a clover lot, that he had hauled about 100 bushels 10 miles, from James River. He told me that he thought this great labor could be afforded for the benefit he derived. But considering it cheaper to buy and haul oyster shells from Petersburg, also 10 miles distant, as return loads, when he sent wood to market, he substituted that mode of supply, until he had obtained and used 26 hogsheads. He has found, however, the lime, though very beneficial, less so than the marl. This operation was stopped by his finding marl on a distant part of his land, by boring, after searching at various times for more than a year. He has to haul the marl two miles to his fields. This is the fourth year since his discovery, and he has marled 100 acres, and is proceeding with unabated zeal.

Mr. John Hite, also between 70 and 80 years old, having no marl of his own, began to marl a part of his land from a neighbor's pit at about 2 miles distance. He did not cover much extent of surface; but even his commencing so heavy a job, upon his observation of the effects obtained by his neighbors, is, like their more extensive and still continued operations, strong proof of the profits being manifest and unquestionable. It is proper to add that the three last named and oldest of these individuals have but scanty means, and would certainly put nothing at risk in experiments, or new practices of doubtful results.

QUERIES TO ASCERTAIN THE ACTION AND EFFECTS OF SHELL MARL AS MANURE, AND ANSWERS AS TO THE OLDEST MARLED DISTRICT IN PRINCE GEORGE COUNTY, VA.*

1. When was the use of marl as manure commenced on your farm?
2. Whose property was the farm, and under whose direction was its general management, (if not your own,) then, and since?

* Within the last few weeks, the reporter visited all the farms concerning which information of recent date will be given below, and submitted the queries to their several proprietors, and obtained and wrote down their answers; which answers were by them afterwards examined, corrected where deemed necessary, and finally approved. In each case, with the queries, a copy of the 'Essay on Calcareous Manures' was presented, for the purpose of enabling all to reply, with full understanding, on the subject of the 23d query; and the several answers to this last query were not taken at first, with the others, but only after time had been afforded for the deliberate reading and consideration of the pages referred to, and which are republished at a preceding page, (481,) for general reference. Such a mode of personal examination was by no means necessary; but it was resorted to in this case, both because published queries had been formerly tried in vain, and because, in the first beginning of this investigation, the explanations of the reporter might be needed, to make clear his own

3. What was the quantity of cleared land on the farm then ready for and subjected in its turn to cultivation of any kind, exclusive of all waste ground?

4. What is the quantity since added, by new clearings of forest land, or other waste spots brought into tillage? And, generally, was the land thus added richer or poorer than the present average quality of the farm?

5. What was the rate of progress in extending the marling—and, altogether, how many acres have been now marled?

6. What was the usual strength of the marl used, or its proportion per cent. of carbonate of lime, or pure shelly matter?

7. Was there any peculiar quality or ingredient, besides the carbonate of lime, that served to give additional value to the manure—as "green sand," or gypsum, or a large proportion of fine clay, &c.?

8. Or was there any thing that served more than usually to lessen the value, as stony hardness of many shells, or of masses of marl, &c.?

9. What have been the usual quantities of marl applied to the acre?

10. Have there been made trials of any *much lighter dressings* of marl than the usual quantities—and if so, what were the results, compared to the usual quantities?

11. Have there been made trials of any *much heavier dressings* than the usual quantities—and with what comparative results?

12. Was the cropping and general management of the land, *for a few years immediately previous to its being marled*, such as might be considered *meliorating* or *improving*, (or at least as *preserving* its degree of fertility,) or was it *impoverishing*, and wasting of fertility in general? State the rotation of crops, if known.

13. The same question as to the few years immediately after marling, and since.

14. What have been the usual and general results of the applications of marl, on the increase of the crop next following, on land in different conditions—and afterwards to the present time?

15. Have the earliest fertilizing effects of marl (or the increased product of the first crop, or first course of crops in the rotation,) been subsequently increased or diminished by lapse of time—and in either case, under, and in proportion to, what circumstances?

16. Is it your opinion, whether founded on experience or observation, that the early increased product of your marled land (say for the first three or four crops, or of any number you have yet made thereon,) will be subsequently diminished, under any rotation of crops, or course of cultivation, that would not have been decidedly exhausting and injurious to the land, if marl had not been applied?

17, Has sterility, or other damage, been caused on any part of the land, by applying marl too heavily, or in any other manner—and under what circumstances of soil, tillage, &c.?

18. Has it been found that any other manures, either vegetable and putrescent, or mineral, are more efficacious, or durable, on poor natural soils *after* marling them?

19. What do you suppose was the average productive power, in corn, per acre, of all your now arable and cultivated land, before marling?

20. What do you suppose is the present average productive power of the same in corn?

21. What was the usual or average quantity of the crops of wheat made annually on the farm before marling, and recently?

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meaning, in queries which perhaps previously had been too obscurely stated; and which queries, after being thus tested by some trial, have been in part recast, and made more comprehensive, as well as more precise and clear, than in their first form. The several answers were given, (and, as above stated, the purport written down as soon as expressed,) by each individual, without his knowing what any other had answered; except in one instance of joint operations in marling, and also in regard to the reporter's own answers, which were prepared after his being in possession of most of the others. Therefore, there was nothing of the opinions or facts of others furnished to serve either to guide or to test and correct any one's estimate or supposition of amounts and values. This, together with the circumstance that quantities and values are almost always stated upon mere supposition and by guess, and without any aid of previously written statements of precise measurements, will serve satisfactorily to account for much diversity in the estimates of products and values. But such diversity, under the circumstances stated, instead of impairing the value of the testimony, would strengthen it, in regard to the good faith of the witnesses, and their intention io furnish correct answers, in the mind of any judicious reader who might not know the other good and sufficient claims of these highly respectable individuals to entire confidence on that score.—Ed.

22. Taking such general grounds for the estimate as may be satisfactory to your own judgment, state what you suppose to be the annual value of the present *general* or *average gross product* of grain, or other marketable products of the fields in cultivation, of the land marled, caused by, and owing to marling—per acre, and also in total amount annually from the whole farm?

23. Does your experience or observation serve to contradict any of the important theoretical opinions in regard to the action of marl, or statements of actual results in practice, as presented in the "recapitulation" embraced in pages 53 to 56 of 'Essay on Calcareous Manures'—and if so contradicting, in what particulars?

I. *Answers to the foregoing queries, by James B. Cocke, of Bonaccord.*

Answer to query 1*st.*—In 1820 or '21, as a regular business. A small experiment had been made by my grandfather, James Cocke, and all knowledge of it forgotten many years before.*

2*d.*—My elder brother, Thomas P. Cocke, until his death, in 1832. Since, my property, and under my direction.

3*d.*—450 acres.

4*th.*—250 acres—much poorer.

5*th.*—To 1830, there had been about 175 acres marled; since, as much more as make 575 acres in all; which is all the arable and cultivated high-land except about 100 acres.

6*th.*—About 45 per cent. as a general average. Some of it much richer.

7*th.*—None known or suspected.

8*th.*—None, except more than usual of large lumps of coral.

9*th.*—About 280 before 1832. Since, 350 usually.

10*th* and 11*th.*—None.

12*th.*—The three-shift rotation, 1 corn, 2 wheat on best parts only, and 3 rest, without grazing. Considered as preservative of fertility, if not actually improving.

13*th.*—The same rotation continued, with clover more recently; until within a few years, when changed to the four-shift rotation, with two grain crops and two years' rest under clover. But little grazing allowed.

14*th.*—About 100 per cent. on first crop; and continuing to increase more afterwards.

15*th.*—Increased invariably. Of the oldest marlings, the present increased product from twice to three times as great as stated above of the first crop.

16*th.*—I believe the improvement already made to be permanent, and never will be diminished under the present or any cultivation not more exhausting.

17*th.*—No damage, except by being "marl-burnt," and that only in small spots, where too heavily dressed for the circumstances of the land. This disease only produced on acid, poor, sandy or gravelly soils, and by too much marl for such ground.

18*th.*—Vegetable or other putrescent manures believed to be more efficacious, and certainly much more durable. Have not tried any other mineral manure after marl.

19*th.*—Excluding the low-grounds (now 30 acres) which have never been marled, the average product in corn supposed to have been 7 bushels the acre.

20*th.*—27 bushels, on the marled land.

21*st.*—150 to 200 bushels, on each shift of whole farm, including the low-grounds (then 50 acres, some having since been sold.) No high-land formerly brought wheat, except the manured and enriched lot land around the houses. Recently the crops from 600 to 900 bushels.

22*d.*—Not quite $10 the acre on the land under

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* This very old experiment, made nearly or quite seventy years ago, and deemed a failure and forgotten until within the last twenty, was stated as below, at page 89 of 'Essay on Calcareous Manures.' Within the last few weeks the reporter revisited this spot, and saw that it still exhibited a decided superiority over all the immediately surrounding land, which, with the farm generally, had been marled, and all very much enriched, since the first published account of this curious and valuable fact.—Ed.

"The two old experiments described at page 36, though the only applications of fossil shells known to me, previous to the commencement of my use of this manure, were not all which had been made, and which being deemed failures, had been abandoned and forgotten. Another, within a few miles of my residence, was brought to light and notice afterwards, by an old negro, who was perhaps the only person then living who had any knowledge of facts. After I had found enough success in using this manure to attract to it some attention, Mr. Thomas Cocke of Aberdeen was one of those who began, but still with doubt and hesitation, to use marl to some considerable extent. One of his early applications was to the garden. The old gardener opposed this, and told his master that he knew "the stuff was good for nothing, because when he was a boy, his old master (Mr. Cocke's father) had used some at Bonaccord, and it had never done the least good." Being asked whether he could show the spot where this trial had been made, he answered that he could easily, as he drove the cart which carried out the marl. The place was immediately sought. It was on the most elevated part of a very poor field, which had been cleared and exhausted fully a century before. The marled space (a square of about half an acre) though still poor, was at least twice as productive as the surrounding land, though a slight manuring from the farmyard had been applied a few years before to the surrounding land, and omitted on this spot, which was supposed to have been, from its appearance, the site of some former dwelling house, of which every evidence had disappeared except the permanent improvement of the soil usual from that cause. A close examination showed some fragments of the hardest shells, so as to prove that the old man had not mistaken the spot. This, like other early applications, had been made on a spot too poor for marl to show but very small early effects; and as only one kind of operation of any manure was then thought of, (that which dung produces,) it is not strange that both the master and servant should have agreed in the opinion that the application was useless, and have remained under that opinion until almost all remembrance of the experiment had been lost."

grain and tobacco. The annual increased product of the farm about $3000.*

23*d*.—Nothing to contradict; and the "recapitulation" confirmed by my experience so far as it extends.

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II. *Answers by John B. Bland, of Fountains.*

Answer to query 1*st*.—In 1826.

2*d*.—My own, then and since, except a small part added by later purchase.

3*d*.—About 150 acres.

4*th*.—250 acres added, making 400 acres in all. The land added much poorer than the present average quality.

5*th*.—In 1826, my first year of possession, marled 30 acres, and by winter of 1836-7 had finished about 350 acres, which was nearly all the land then open, and all that was easily reached, and deemed profitable to marl. Since, only new clearings marled, 26 acres, making 376 acres in all marled.

6*th*.—One kind from 25 to 30 per cent. Another, which was used more largely, and for all the ridge land and new clearings, is 26 per cent.†

7*th* and 8*th*.—None.

9*th*.—300 bushels. On new-ground 400.

10*th* and 11*th*.—None.

12*th*.—Exhausting, having been rented out, severely cropped, and no regard paid to preserving its value.

13*th*.—Improving—being the three-shift rotation, with clover, and without grazing or mowing any clover.

14*th*.—An increase of from nearly to quite 100 per cent. of first crop, on most of the land. Less per cent. on the poorest—say such as produced before but 5 bushels of corn to the acre. And on these poorest parts, the after increase also is less than on better land.

15*th*—Increased invariably on my land, except on marl-burnt spots; and these were not considerable, and were easily cured by applying there putrescent manure. On another farm, then my residence, and then and until recently held as rented land, 17 years ago, I marled a piece of old tobacco lot land, of good soil, and before marling, as rich, from frequent manuring, as it well could be. This land has borne a grain crop every year since, without any more help. There was but little increase of crop seen at first from the marling, and the land is now reduced very much below its then and previous rate of product.

16*th*.—No such diminntion in any future time, expected or feared.

17*th*.—Not except the marl-burning as before stated. That produced only on the poorest, and naturally poor land.

18*th*.—No other mineral manure tried. Putrescent manure much more durable after marling. Not sure that it is more efficacious for first crop.

19*th*—Ten bushels.

20*th*.—Thirty bushels.

21*st*.—About 4 bushels to the acre before marling, and from 8 to 10 at this time after corn. No fallowing for wheat.

22*d*.—$6 66 per acre on all land in grain, and $1800 annually on the whole marled land of the farm.

23*d*.—No contradiction to the "recapitulation."

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III. *Answers of Edward A. Marks, of Burley.*

Answer to query 1*st*.—In 1827, except a few acres marled here by my father in 1820, that being his first experiment.

2*d*.—Mine.

3*d*.—170 acres.

4*th*.—100 acres, of which 40 was richer, and 60 much poorer; and the general average poorer than the whole farm now.

5*th*.—From 1827 to 1830, about 50 acres, and since, 180 or in all about 230 acres, all of which was done by 1836. Since, other employment (cutting timber for market) has prevented my continuing marling; but it is now just about to be resumed, and the balance of the land will soon be marled.

6*th*.—Not known—but the marl was generally strong.

7*th*.—None.

8*th*.—Nothing unusual, except as to the marl from one pit, which covered 15 acres, and which was very hard, and many of the lumps still remain on the field.

9*th*.—Up to 1830, the quantity intended to be applied was 400 bushels, and since, 300; but both these desired quantities were often exceeded in the actual application.

10*th*.—None less than 300 bushels; but in some cases, on the more sandy land, where this quantity was applied of the poorest marl, the effects were better than from richer marl, or heavier dressings.

11*th*.—One piece of newly cleared wood-land marled 4 years ago at 800 bushels to the acre, is now less improved than adjoining and similar land marled with half the quantity.

12*th*.—About half the land now cultivated has been gradually cleared since 1827, of its original forest growth. The other half had been long cleared, and under the three-shift rotation,

* It was deemed preferable to inquire as to increase of *gross* products, instead of the increase of *net* products from marling, because of the greater uncertainty of the calculation as to the latter. But all the witnesses agreed in this opinion, that one-fourth of the gross product of grain and other marketable crops, together with all the increase of offal, would fully compensate, and generally more than compensate, for the increased labor of cultivation &c. caused by marling. Therefore, of the amount of *gross* products stated above, and elsewhere, three-fourths at least were deemed by all the witnesses to be *net* product; which would be the return and profit for the digging and laying on the marl, which of course are not counted in the increased expenses of cultivation, handling, and carriage of crops.—Ed.

† The first kind of marl is that of the "broken river banks," of which a part stretches far into this tract. The other kind was considered by Mr. Bland as very superior in appearance and quality, and had been supposed to be much richer than was found, (as stated above,) from analyzing a specimen which he furnished for that purpose.—Ed.

with no grazing; but no manure, as all the offal of crops was carried to the then homestead on the adjoining Old Town farm. This system supposed to have been preservative, but not improving.

13*th.*—The same three-shift rotation continued, until 4 years ago, when changed to the four-shift, with 2 grain crops in 4 years on the inferior land, and 3 in 4 years on all the new and better land.* This last found to be too severe, and shall return to the former three-shift course.

14*th.*—On the old land, 100 per cent., except where galled, and there very little early increase. On the new-ground, all marled before its first crop, and therefore cannot state the earliest increased product. Now, supposed 150 per cent. on the old, and full as much improvement on the new land, over what might have been its early product without marling.

15*th.*—Increased—in all cases except on spots marl-burnt, by excessively heavy dressings. This injury the greatest on very light and poor, or galled land.

16*th.*—No subsequent diminution expected.

17*th.*—None, except as before stated on the small extent of marl-burnt spots. A small piece of before very poor and exhausted land, on a neighbor's farm, which was marled from my pit 13 years ago, at fully 800 bushels to the acre, after its first succeeding crop was made, and to this time, has continued perfectly barren.

18*th.*—Vegetable or other putrescent manures certainly more efficacious at first, and the effects more lasting. Believe that one load of any such manure on marled land is fully worth as much as two on similar land not marled. Have tried no other mineral manure.

19*th.*—10 bushels to the acre.

20*th.*—From 22 to 23 bushels.

21*st.*—Formerly, 121 bushels—that having been the actual average of three successive crops. Since, and recently, about 500 bushels the average crop of wheat.

22*d.*—Suppose the average gross increased product to be $6.66 the acre for the grain, tobacco, &c., of each crop, and $1020 of annual increase on the whole marled land.

23*d.*—Nothing contradicting any part of the "recapitulation," in my experience or observation.

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IV. *Answers of John H. Marks, in regard to Old Town farm.*

Answer to query 1*st.*—In 1827, except 10 to 15 acres marled about 1820.

2*d.*—My father's, until his death in 1822—then under direction of my brother Edward A. Marks, until in 1833, and since in my possession. Until 1833, this farm and Burley kept together, and the same general management as to marling.

3*d.*—400 acres.

4*th.*—50 acres; poorer than the present general average; 65 acres of the fields not cultivated for 8 years before being marled, because of the great poverty.

5*th.*—From 1827 to 1840, about 288 acres; 300 in all.

6*th.*—Same pits used as for Burley, and same answer—as also to 7th and 8th queries.

9*th.*—Before 1833, 400 bushels; since, 300.

10*th.* and 11*th.*—None observed.

12*th.*—The three-shift rotation with close grazing; of course impoverishing.

13*th.*—The like treatment until 1833; since, 4 shifts, and 3 grain crops in 4 years on nearly half the land. No grazing, and clover sown generally.

14*th.*—Suppose 80 per cent. Something better now.

15*th.*—The small subsequent and additional increase is general.

16*th.*—No such diminution expected to occur.

17*th.*—Only by marl-burning, and that in poorest spots.

18*th.*—Yes, both, and under all circumstances. Would not put manure on the land not marled.

19*th.*—About 10 bushels, except on 40 acres of lots, which had been kept highly manured for tobacco, when that crop was formerly made, and which would have brought 30 bushels of corn to the acre before being marled.

20*th.*—About 25 bushels average.

21*st.*—350 bushels before marling—700 now.

22*d.*—Estimated at same rate as on the Burley farm—$6.66 the acre, and about $2000 annually for the whole marled land.

23*d.*—Nothing known which contradicts or opposes the statements in the "recapitulation" referred to.

* This is the four-shift rotation as pursued at Shirley and Westover, of, 1st year, wheat on clover, 2d, corn, 3d, wheat, and 4th clover left untouched, to be ploughed under in autumn for next crop of wheat.—Ed.

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V. *Answers by Lt. Harrison H. Cocke, U. S. N., in regard to Evergreen farm.**

Answer to query 1*st.*—About 1827.

2*d.*—The farm then the property of Mrs. Rebecca Woodlief, and the entire management under overseers. Since 1830, under my direction, and more recently, I became the exclusive proprietor.

[3*d* and 4*th* queries not in the first draught sent to the writer, and therefore not answered. The same remark will apply to other queries which will have no answers.—*Ed.*]

5*th.*—Previous to 1830 there had been only 60 to 70 acres marled. Afterwards, and up to the present time [January, 1839,] there must be between 500 and 600 acres more marled.

6*th.*—It varied in strength from 25 to 60 per cent. of pure shelly matter.

7*th* and 8*th.*—Nothing more than usual.

9*th.*—From 200 to 300 bushels the acre; the greater quantities being given in proportion to the then greater productive power and stiffer texture of the land.

10*th.*—None.

11*th.*—Only as heavy as 400 bushels, on poor stiff and moist land, and with much increased advantage in the results. But, with such heavier dressings. I applied, at the same time, a good

* The paper of which these answers are an abstract and abridgment, was written at and sent from Pensacola, January, 1839, where the writer had not the means of reference to any written memoranda on the subject.—Ed.

covering of pine leaves and other litter raked up in the woods.

12*th*.—Impoverishing considerably—having been long under the three-shift and close grazing system, with very careless and bad tillage.

13*th*.—Same exhausting course to 1830. Since, the three-shift system without grazing, and deep ploughing first introduced.

14*th*.—The increase of previous products, on the first crop after marling, has always been considerable, and sometimes has been as much as 100 per cent. The subsequent increase not so perceptible; but the continued and gradual melioration of the soil very evident. The greatest improvement generally made on stiff red clay soil.

15*th*.—Increased; but, as stated above, gradually, and the improvement never very marked at any one time after the first crop.

16*th*.—No such subsequent decrease expected.

17*th*.—No case of sterility produced.

18*th*.—It is my opinion that all vegetable or putrescent manures are much more efficacious after marling than before, on poor natural soils. Have used no other mineral manure after marling except the gypseous and green-sand earth from the bank on this farm, which has been tried at the rate of 30 bushels to the acre, and with marked beneficial results, particularly on the growth of clover and other grasses.*

[19*th* to 21*st* queries were not among those first submitted, and therefore are not answered.]

22*d*.—I suppose that the *net* product caused by marling, under a proper corresponding system of cultivation, is 50 per cent. per annum.

23*d*.—Not having read the work for several years, and not having it now to refer to, I can only say that according to my recollection there was nothing known which served to contradict any of its important positions, or statements of practical effects.

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VI. *Answers of Elgin Russell.*

Answer to query 1*st*.—In 1827.

2*d*.—Mine.

3*d*.—Only 30 acres of poor high-land, and 20 acres of low-ground.

4*th*.—142 acres; poorer than the present average.

5*th*.—1827 to 1820, about 20 acres, and since 130, making 150 in all.

6*th*.—Varying from 25 to 50 per cent. in different diggings.†

7*th* and 8*th*.—None known. But the green earth which lies under the shells, in some of the pits, was at first used to considerable extent, with the marl above. I perceived no difference of effect, either beneficial or injurious, or less effect, from this mixture. This green earth was not any where applied entirely separate, so as to show whether it had any effect, or differed in effect from the marl.

9*th*.—200 bushels to the acre, except on new-ground just cleared, where 400 bushels were given.

10*th* and 11*th*.—None other than stated in the preceding answer.

12*th* and 13*th*.—Hard worked and cruelly used, both before and after marling, owing to my not having enough land open for cultivation to permit any to have rest. The relief afforded by the three-shift rotation (one year of rest in three,) begun to be afforded within the few last years only.

14*th*.—The usual increase of next crop after marling, about 100 per cent. on old land producing previously from 5 to 10 bushels of corn to the acre. On new and richer land only 30 to 35 per cent. A gradual increase on both since.

15*th*.—Increased, but less visibly than in the earliest effects.

16*th*.—No such diminution expected under the circumstances stated in the query.

17*th*.—No damage, or reduction of product, except on the most miserable poor spots of ground, where the marl was put too heavily.

18*th*.—Believe that both vegetable and other putrescent manures are certainly more efficacious after marling; but whether more durable, I am unable to answer.

19*th*.—10 bushels.

20*th*.—20 bushels.

21*st*.—150 bushels before marling and 350 now.

22*d*.—Suppose the increased gross product in grain, or marketable crops, to be worth $3 the the acre on all the marled land—or $426 annually on the farm.

23*d*.—No contradiction to the opinions and statements referred to.

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VII. *Answers of Theodorick Bland, of Jordan's Point.**

Answer to query 1*st*.—In 1830.

2*d*.—My own.

3*d*.—350 acres.

4*th*.—About 12 acres.

5*th*.—200 acres marled to this time.

6*th*.—50 to 60 per cent.

7*th* and 8*th*.—None known of either. When I first began to marl, I supposed (from incorrect information) that the greenish earth, which lies beneath, was marl, and the richest kind; and until better informed, I applied this earth in preference, and alone and very heavily. 15 acres were thus covered, at about 700 bushels to the

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* This body of "green sand," or of "gypseous earth," as I termed it, in my ignorance of geology, is on the river, just below the mouth of Bailey's Creek. It is the richest known of all this district, and was the first discovered by myself, in 1817. See my account of the "Gypseous Earth of James River," at page 207, vol. i. of Farmers' Register.

† Part of Mr. Russell's marl is that of the "broken banks," a valley of which extends into his land. This, as elsewhere, lies over a greenish earth, containing green-sand, and not any carbonate of lime; and this under-stratum he dug up and used indiscriminately with the marl above, at first, as stated in the next answer.—Ed.

* These answers are confined to Dr. Bland's land, held in 1830 and since, and does not include the larger quantity of the original Jordan's Point land, which he held through this time as a tenant, and of which he has very lately become, by purchase, the holder in fee simple.—Ed. F. R.

acre. No effect seen, good or bad. The same land after some years was also marled.
9*th*.—About 350 bushels.
10*th* and 11*th*.—None of either.
12*th*.—A scourging and exhausting course. The rotation was, corn, wheat, and close grazing; and, instead of the year of rest (or grazing,) sometimes another grain crop taken from the richer part of the land.
13*th*.—Improving; the rotation since, 1st corn, 2d wheat, 3d, clover preserved entirely from grazing and mowing.
14*th*.—On neutral soil, originally very rich and much reduced, the first increase supposed to be 30 per cent, but since more than 300 per cent. known by measurement of products before and since marling. On light and acid soil, first crop supposed to be increased 75 per cent., and now 400 per cent. on the productive power before marling.
15*th*.—Always increased.
16*th*.—No such diminution believed possible.
17*th*.—Only by marl-burning, from too heavy dressing on some very light and poor spots.
18*th*.—Both more efficacious and more durable.
19*th*.—About 20 bshels of corn on the best half, and 7 bushels on the worst half; or say 13½ bushels general average.
20*th*.—35 bushels.
21*st*.—The richer half of this land, about 115 acres net (the Point field,) alone brought wheat before marling; and on that, 800 bushels was considered a good crop. Recently, estimating the whole from the actual product of the part under wheat, the then and present productive power of the same land is estimated at 2500 bushels of wheat, to be made after corn.
22*d*.—$9.50 the acre, for the land annually under tillage; and $1100 annually for so much of the farm as is embraced in these answers.
23*d*.—No contradiction.

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VIII. *Answers of Edmund Wilkins, of Springfield farm.*

1*st*.—In winter of 1834-5, except a few acres covered by the former occupant, some years earlier.
2*d*.—Mine. The land bought just before my beginning to marl.
3*d*.—263 acres.
4*th*.—170 acres, and much poorer than the rest of the farm, with the exception of about ten acres; which was good tobacco land when cleared.
5*th*.—214 acres marled since 1834.
6*th*.—About 42 per cent. The marl procured with great labor, at one extremity of the land, and much of it hauled a mile, and some of it one and a half miles.
7*th* and 8*th*.—None.
9*th*.—From 180 bushels on poorest, to 320 on best land.
10*th* and 11*th*.—None of either observed, or worth naming.
12*th*.—Impoverishing, and the land greatly impoverished.
13*th*.—The three-shift rotation, with very little grazing. Considered *preservative* of its existing fertility, if not improving.
14*th*.—On the poorest land, forming much the greater proportion of the farm, and, before marling, bringing about 5 bushels of corn to the acre, the increase of the first crop from 100 to 150 per cent. On much better natural land, and not very much reduced, the first increase not more than 30 or 40 per cent. Very little land yet has borne a second course of crops; but that little, on the second cultivation has shown an additional improved product of full 50 per cent more, upon the former poorest product.
15*th*.—Have not enough experience for my opinion to be worth more than was stated in the preceding answer.
16*th*.—No such diminution expected.
17*th*.—A few small spots only, very poor and sandy, or galled, have been marl-burnt.
18*th*.—Not assured that the first effects of putrescent manure is greater on marled land; but sure that it is more durable. No other mineral manure tried.
19*th*.—About 5 bushels of corn per acre.
20*th*.—About 15 bushels of corn to the acre.
21*st*.—About 3 bushels per acre, and at this time well produce 8 bushels per acre.
22*d*.—$3.50 the acre on the cultivated land—and about $736 on the whole 214 acres, counting all, whether under tillage or at rest.
23*d*.—Know nothing that opposes, or that does not fully agree with the statements and opinions given in the "recapitulation."

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IX. *Answers to the queries by William Wilkins.*

Answer to query 1*st*.—In 1833, a few acres marled. In 1835 regular marling begin.
2*d*.—My own.
3*d*.—60 acres.
4*th*.—40 acres, making 100 in all now open and cultivated.
5*th*.—About 70 acres marled to this time.
6*th*.—From 45 to 52 per cent. All hauled from the pits of other persons' adjacent farms.
7*th* and 8*th*.—None.
9*th*.—300 bushels.
10*th* and 11*th*.—None.
12*th*.—Exhausting.
13*th*.—Improving. Three-shift rotation, with clover, not grazed generally or mowed.
14*th*.—Product more than doubled the first crop after marling; and considerably more since. The greatest improvement by marling made on the pine old fields; the trees belted for bringing the land into cultivation.
15*th*.—Increased in all cases.
16*th* and 17*th*.—No.
18*th*.—Manure lasts longer.
19*th*.—From 5 to 7½ bushels of corn.
20*th*.—25 bushels.
21*st*.—A few acres only of old improved lot around the house formerly sown, which brought about 60 bushels of wheat. No regular and full wheat cropping as yet. Two of the shifts (of 33 acres each) supposed would bring 10 bushels to the acre. The other, too light, and too poor as yet, to be worth sowing in wheat.
22*d* and 23*d*.—Not answered.

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X. *Answers to the queries, by Richard M. Harrison, of Huntington farm.*

Answer to query 1*st*.—In 1834.
2*d*.—My own.

3*d*.—About 200 acres.
4*th*.—Nothing added.
5*th*.—Marled about 20 acres a year. At this time, 120 to 130 covered.
6*th*.—Not known.
7*th*.—None.
8*th*.—In a part of the marl, many hard masses, which however were mostly left at the pits.
9*th*.—From 250 to 300 bushels of marl.
10*th* and 11*th*.—No such trials.
12*th*.—Impoverishing; the three-shift rotation.
13*th*.—Improving.
14*th*.—On first crop, about 50 per cent—and since about as much more.
15*th*.—Increased in every case old enough to judge of.
16*th*.—Think it never will.
17*th*.—A little of the ground marl-burnt by too much being given.
18*th*.—Yes, as to vegetable and putrescent manures.
10*th*.—About 10 bushels.
20*th*.—About 20 bushels.
21*st*.—Before marling the annual crops of wheat were about 300 bushels. Since, they are about doubled.
22*d*.—About $3.50 per acre, to the land under grain annually; and $466 annually on the whole farm.
23*d*.—No contradiction, so far as my short experience extends.

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XI. *Answers by Edmund Ruffin, in regard to Coggins' Point farm.*

Answer to query 1*st*.—On Coggins' Point farm, on James river, in January, 1818.
2*d*.—My own property, and under my personal direction from 1813 to 1832; afterwards under my overseers, until 1839, and since in possession and charge of my son, Edmund Ruffin, Jr.
3*d*.—In 1818, about 540 acres, of which 68 had been cleared since 1813.
4*th*.—About 197 acres added, principally by new clearings, making 737 of tilled land now. Nearly every new acre added since 1813 was poorer than the present general average, and without exception as to the clearings since 1817. The average quality of all the new land was poorer than the present general average of the whole farm, by nearly one half.
5*th*.—In 1818 marled 15 acres.

1819	62
1820	25
1821	80
1822	93
1823	100
1824	80

when nearly all the then open land which was supposed to need marl had been covered. By 1830, the marled surface had been increased to 670 acres of cultivated land, and since, to 51 acres more, of pasture and wood-land not cleared.
6*th*.—Most of the marl used contained from 37 to 40 per cent. of shells, or carbonate of lime. Another kind averaged about 45 per cent. Another, (the marl of the broken river banks,) used perhaps for 100 acres, had from 20 to 25 per cent., the remainder of its contents being coarse sand. The bed of peculiar appearance, and greatest strength, under the north end of the peninsula, contains 61 per cent. This, being distant, was used for about 60 acres only.
7*th*.—None, except the last-named in last answer. This contains also a very small proportion of gypsum, some "green-sand," and a very small proportion of some soluble saline matter.
8*th*.—Only the usual degree of hardness of the shells, and the proportion of earth not calcareous being, as usual, principally of silicious sand.
9*th*.—For first three years, generally 500 to 600 bushels. Afterwards 300 to 400.
10*th*.—As little as 96 bushels have been used. The early effects much less than of larger quantities. This and other light dressings being deemed quite too small, were added to, in a few years, so as to be made equal to what was then supposed a proper and sufficient rate.
11*th*.—As much as 1200 bushels were tried, and without injury, or perceptible greater early benefit than 600 produced on adjacent ground. This land then newly cleared, and since also well manured from the barn-yard. The lighter marlings, say from 3 to 400 bushels, as productive on the second round of crops, if not on the first, and more profitable than any heavier—except where much vegetable matter was also given to the ground, then or afterwards; in which case, more marl was required, and in proportion; and was used profitably, if given heavily at first.
12*th*.—The four-shift rotation (1st, corn, 2d, wheat, where not too poor to bring it, and 3d and 4th, the natural grass and weeds, not grazed,) had been pursued since 1814; and this very lenient rotation was barely enough improving to compensate for the injury caused by washing, the land being generally hilly.
13*th*.—The same rotation continued after marling, and then it became decidedly improving. Some years afterwards, clover sown on all wheat. For the last 10 years, the course of cropping has been more severe (by taking an additional wheat crop on the best land under clover, or in the second year of rest,) and also partial grazing permitted. Still, the system of cultivation is improving to the land, though less so than before, when milder.
14*th*.—On newly cleared poor and acid land, but full of rotten vegetable matter, and in its best state for producing, the increase from marling on first crop about 50 per cent or more. On old and previously much exhausted land, the first increase from 80 to 120—and in some cases more than 150 per cent. On the same lands, now, 10 to 20 years after marling, the increase upon the original product is from 200 to 400 per cent. and generally fully double the earliest increased crop, next after the marling. On poor stiff soil, the increase and profit of marling less than on poor light soils. On neutral soil, naturally rich, but impoverished, the early increase much smaller, but growing with time. On calcareous land, no benefit.
15*th*.—Increased always, when of any benefit at first, except where much "marl-burning" was caused by the dressing having been too heavy.
16*th*.—No general diminution expected, and none believed to be possible, under a mild and judicious rotation of crops.
17*th*.—Only as above stated, from marling too

heavily; and that was the more readily produced, (when the marling was alike,) in proportion to the poverty of the land and the severity of its tillage. The disease of "marl-burning" prevented or removed by giving vegetable matter in proportion to the excess of marl. A large space has been thus diseased; but by rest, and vegetable matter, the injury has been almost every where cured, or prevented.

18*th.*—Putrescent manures believed to be more efficacious at first, and certainly more lasting in effect, and far more profitable, on marled land. Gypsum, and also "green-sand" generally having more or less effect on clover after marling, on acid land, and *always* quite inoperative there before marling.

19*th.*—Certainly not exceeding 12 bushels; I incline to think not more than 10. All cleared since 1818 was marled before being cultivated.

20*th.*—From 25 to 27 bushels per acre. The largest crop yet made was in 1839, amounting to 4500 bushels. Of this crop one entire field of 112 acres which had been all originally of poor and mean soil, and all, both new and old land, quite poor when marled, was supposed to have averaged 30 bushels to the acre.

21*st.*—The general average of my six first years' crops, immediately preceding marling, was 637 bushels. The average product per acre, in the first three years, was 5⅔ bushels, on the richest half of the land—wheat not being sown on the poorest half. The greatest crop made before marling was 896 bushels. The greatest since, in 1831, was 2500. This year, (a very short crop here and generally) the quantity made was nearly 2000 bushels. Allowing for the recurrence of all the usual measure of diseases and disasters to which this latterly very precarious crop has been subject, the actual average annual product of wheat is estimated at 1800 bushels. This is believed to be greatly below the productive power of the several shifts. The causes of usual and greatly reduced product are principally the ravages of insects.

22*d.*—I suppose $8 ger acre, on all the land each year under marketable crops; and for the quantity of land usually under tillage, about $3200.*

23*d.*—No answer requisite, from this source.

Concluding General Remarks, on the Queries and Answers.

It will scarcely be necessary, for the benefit of observant readers, and might be deemed obtrusive, to sum up and compare the evidence presented in all the foregoing answers. Therefore, without noticing any which present opposing or disputed opinions or facts, it will merely be here stated that *all* the witnesses concur in maintaining the following positions:

1st. That every application of marl made by them has produced immediate and considerable benefit; and that the benefit has afterwards increased with the lapse of time, under all ordinary circumstances, and any cultivation which was not very injudicious, and manifestly destructive.

2d. That the marling operations of every individual named, on his own testimony, (and judging from their continuation and extent, still more than from opinions stated of particular results,) have been highly profitable.

3d. That marl, in all this district at least, has been found to be a certain and great enricher of naturally inferior and poor soils.

4th. That vegetable and other putrescent manures are much more serviceable and profitable on marled lands.

5th. That the beneficial effects of marling are not transient, but permanent; and no future abatement of the early improvement is counted on, or supposed possible, under a proper system of tillage.

6th. That a large increase of annual income, and consequently of general value of the land, has occurred in every case of extensive marling.

7th. That experience and observation, so far as extended, serve to sustain, and in no case to contradict, the more detailed views, and numerous statements of facts, or of opinions, which are referred to and embraced in the concluding query.

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* This is estimated on the supposition of the increase of corn per acre being worth $10, of wheat $6, and that rather more than half the land is under these crops; or, if more, that this product at least is obtained. Their offal and the clover are not estimated as market crops, but considered merely as sources of manure and improvement. All the long continued effects of putrescent manures, and all the benefits of clover as manure, are counted as due to marling, as there would be neither of these benefits existing without having marled.

From the Carolina Planter.

BOTS, AND THEIR CURE.

In the History of the Horse, pp. 159-60, this disease is treated with apparent disregard, and the compilers of the work give only the experience and knowledge of Mr. Bracy Clark on this subject. That he knew nothing of the danger of bots, (the larvæ of the Œstrus equi,) is very evident, and his profound ignorance could not have come within the knowledge of the compilers, else they would not have admitted his opinion in a work of such general circulation, and in other matters relative to the horse, of such utility as the work above quoted. He advances the idea that the gad fly merely takes advantage of the *internal* structure of the horse to *perpetuate* its *species*—that it is *not the enemy* of the horse, and therefore not *injurious*—and that in due course of nature it will free itself from its prison birth-place. The first assertion I admit. The object of this article is to expose the fallacy of the second—and with him I agree in the latter, provided the constitution of the animal is sufficiently strong to bear up against the ravages of this truly carnivorous destroyer. Yet I shall attempt, and I hope satisfactorily, to show that many valuable animals are annually sacrificed to ignorance and the too frequent consultation and credence given to this book on this subject. Mr. Clark's doctrine is, that the bots are fastened to the cuticular and insensible coat of the stomach, and that therefore they are unapproachable by medicines. Actual experience and observations have shown to me, that in the early stages of the life of the larvæ they feed on the delicate mucus of the stomach—yet I have examined horses whose stomachs were perforated not only through the cuticular,

but through the outer coat, so that the half digested contents of the stomach escaped into the hollow of the chest—which was the work of the larvæ—for there was not that appearance of decay which would denote such inflammation as would cause rottenness of the stomach; and the *raw edges* of the orifices *plainly indicated* that the stomach had been gnawed through by the grub.

I am convinced that as soon as the horse becomes feverish, and when that food which is most congenial to the appetite of the larvæ is diminished by the heat of inflammation, they attack the stomach, and from their carnivorous nature are soon enabled to pierce it entirely through, which causes instantaneous death. It has been argued that their "heads being covered by the mucus and cuticular coats of the stomach to which they are attached, they cannot be affected by any medicines which may be administrated with safety to the horse." I acknowledge that such medicines as brine, oils, and spirits of turpentine, will never cause them to detach—and it is reasonable to suppose that these will have no effect, as the larvæ will live in the first 48 hours; in oils, 15 hours; in spirits of turpentine, 3½ hours, and even in nitric acid, 37 minutes.

The larvæ is carnivorous, and created to be the *scourge* of the horse during that period which nature has ordained they should abide in the stomach. Such horses as are kept stabled are very seldom liable to inconvenience from them: and in every instance we find that horses which have been, at some time previous, grazing or running at large, are the victims. This is owing, I presume, to the fact that the urine of the stable prevents the œstrus equi from breeding when the larvæ is voided under its influence, and that greater numbers are bred in pastures, where the sun and the nature of the situation tend to facilitate their generation.

I have never found relief in any case of bots, unless the following remedy was administered, which was communicated to me by a gentleman of the west.

Two buttons of nux vomica, pulverized or rasped up, and a decoction made by boiling it in 1 pint of water, boiling it until the quantity is decreased to half a pint. Give the horse this, and repeat the dose until relieved, administering the doses at intervals of two hours. I have known, in one instance, seven doses to be given, and have never known the remedy to fail in a case of bots if taken in time.

This remedy will prove itself when it is considered that the bot is carnivorous and nux vomica is a *sure poison to all carnivorous* animals; whilst the horse being gramnivorous, it cannot be of injury to him or animals of that species. After this being administered to a horse he will invariably thrive finely; which would suggest that it perhaps would be prudent for us to use this as a preventive, and therefore obviate the necessity of using it as a cure.

Newberry, S. C., July 16, 1840.

[The article referred to above, from the History of the Horse, and which maintains the opposite doctrine of the harmlessness of bots, was inserted at page 251 Vol. II. of Farmers' Register.—Ed. F. R.]

AGRICULTURE IN MASSACHUSETTS.

Morals of Labor.

From the New England Farmer.

Whoever had the pleasure of hearing Gov. Hill at the State House the last winter, at one of the agricultural meetings, will not have forgotten some admirable remarks made on that occasion by this gentleman. If we had access to them, we certainly should transcribe them, as embracing precisely our own opinions in relation to the subject. Our young men in general, when they go to service, or as it is customarily termed, "hire out," seem to think that there is something degrading in the idea of being servants; and bring with them so much of what they deem a proper spirit of independence, that they forget the employer has any rights, and take pride in insolence and ill-manners. Now we protest against meanness and servility, but still more against incivility and insolence. The truth is, that no honest employment is derogatory to any man; and we cannot name a man in the community who is not a servant in some respects to others. Many situations in life, which to the multitude are objects of envy, are situations of extreme drudgery, much more severe both to mind and body than labor on a farm.

The laborer has his rights and duties. Having entered into service for a fixed compensation, unless express exceptions are made at the time of the engagement, he is bound to render his best services on the farm, in the most assiduous and faithful manner, under the direction of his employer, whether he approves that direction or not; and we know of but one rule for an honest man, which is to consider his employer's interest as his own, and do in every respect in the case as he would judge it right to do if the situations were reversed, and he were the employer instead of the employed. The employer is bound on the other hand, to furnish the laborer with a sufficiency of good and wholesome food, suitably prepared; comfortable lodgings; exact no unreasonable service; and treat his laborers with kindness, civil language, and all proper confidence. This comprehends all the mutual duties as we understand them. It often happens that hired men are disposed to make difficulties if two tables are set. In this matter let the householder never yield a hair's breadth of his authority. In many cases it is most convenient to have but one table; but in this respect the laborer has no claims except to a sufficiency of good and wholesome food, prepared properly and seasonably; but he has no right nor shadow of right to interfere with the farmer's domestic arrangements, as oftentimes it must break up entirely that domestic quiet and privacy which constitute the chief pleasures of domestic life. We have no arbitrary distinctions of rank in this country, and every man's standing depends upon his moral character. One man is as honorable as another, who behaves himself as well as another. But then our pursuits in life are very different from each other. Our tastes are not always congenial; and it is not necessary, that under the ridiculous pretence of maintaining a nominal equality, we should sacrifice the comforts of life by associations which are not in truth agreeable to either party. Where it can be done without being offensive or inconvenient, we admit that it would be much more

economical and convenient to form but one family; but we maintain that this is entirely at the option of the employer, in respect to which the laborer has no demands whatever.

There is a matter which a few years since gave a great deal of trouble to farmers, which the wholesome decisions of the courts have materially corrected. Then laborers felt that their employers were in their power; and that they were at liberty to quit the service and demand their wages at their pleasure. Sometimes in the midst of planting, or haying, or harvesting, either through mere caprice, but most commonly with the expectation of getting higher wages, they would quit their employer and leave him under every disadvantage. The courts having decided that no man is entitled to his wages who, without good and sufficient cause, fails to continue his agreed term, the employer has a proper remedy in his own hands, which will keep this matter right.

There is another point in this case of the morals of labor, upon which we have not the power to animadvert with too much severity; and that is, a practice among employers of seducing by bribes or intrigues, or some vile means, a laborer from the service in which he is engaged. We have known this done so frequently, and under circumstances of such extreme inconvenience and loss to the injured party, that no words can express our sense of its baseness. It is a gross violation of all faith and honor; and a man who would directly or indirectly be guilty of such an act, ought to be pronounced an outlaw of civil society.

The matter of providing for laborers has become a very serious affair; and gross extravagance has come in here as into every other department of life. A hired man, when he demands sixteen dollars a month and his board, generally estimates his board as of no consideration. But in few parts of the state can a man be boarded for less than eight or ten dollars a month; and when the farmer perceives that instead, as the laborer pretends, he is paying only sixteen dollars a month, he is in fact paying twenty-six dollars a month, the burden becomes very heavy. Our habits of living have become too luxurious. The habit of five meals a day which prevails on many farms, is most pernicious to the health. We know well by experience that three meals a day, at 6 A. M., at 12 P. M. and at 6 P. M., with sometimes a cracker or two in the forenoon, is all that is essential or beneficial. Nothing is more unfavorable to health, both of body and mind, than by frequent eatings to keep the organs of digestion under continual exertion; and to attempt to labor with the stomach filled to repletion. The allowance formerly of a Scotch laborer in time of haying and harvesting, and no men ever labored harder or enjoyed in general firmer health, or were capable of going through greater hardships, was a peck of oatmeal on Monday morning, and a gallon of milk a day. This was the week's allowance, and he prepared it in any way which pleased him. The allowance of a field laborer at the south is one and a half peck of corn meal per week and three and a half pounds of pork or bacon, or two and a half pounds of pork and fourteen herring. With this they labor constantly from daylight to dark, with only an occasional hour allowed them some Saturday evening. Their health is good; and we were told by many of them that the supply was in general more than they required. Water is their only drink. Now most certainly we do not refer to such cases as these with any desire that our laborers should be abridged of a single comfort; but as displaying the extremes to which our extravagance leads us; and to show how much less is required than we generally suppose, to maintain the vigor of the human frame, and to support men in health under the severest toil. We are satisfied that our present system of management is actually prejudicial to health and morals. How a remedy shall be found and applied, is more than we can say.

The temperance reformation has been an immense gain both to employers and laborers. The very personification of evil, in our opinion, is rum; and the blessed change which even its imperfect progress has produced in the country, is every where apparent, and fills the benevolent bosom with inexpressible joy and the brightest hopes.

H. C.

TO PRESERVE CUCUMBERS FROM INSECTS.

From the Agriculturist.

In the spring season, as soon as the young plants show themselves above ground, place 20 or 30 cotton seeds close around each plant so as to touch it, and it is sure to escape all predatory bugs. The cotton seeds should not be removed till the vines begin to run. I give this statement upon the authority of Mrs. Tabitha Moore, consort of Capt. A. Moore of this county. She has followed the practice between 15 and 20 years with uniform success. Let the amateurs of the garden try it.

F. H. Gordon.

CHICORY.

From the Agriculturist.

Messrs. Editors:—The celebrated Arthur Young, during an agricultural tour in France, saw this plant there cultivated and used for soiling both cattle and horses; so highly did he esteem it, that he carried some back with him to England, and declared if he did nothing more than introduce the use of chicory among the farmers, he had fully discharged his duty to his king and country. The late General A. Jones, of North Carolina, from the high encomiums passed on it in the works of Mr. Young, was induced to import some of the seed. It was sown in drills—the product was immense, and all kinds of stock eat it voraciously, but it was found to be indigenous in Carolina; there was difficulty in the collection of the seed; he abandoned the cultivation, but always spoke highly of its yield and its qualities for soiling. It seems to be of the lettuce family; grows from 5 to 7 feet high, and may be found in large quantities along hedge or turn rows in cultivated fields, which the stock is kept off, but when cows or horses can get it, they invariably eat it into the ground. If cultivated, it will yield about sixty thousand weight of green food to the acre, is succulent and rich, stalk, blade and all, are consumed by them.

There is much growing in the fields around

Nashville, and it will afford me pleasure to show it to any gentleman, and convince by actual experiment how fond stock are of it.

A. J. DAVIE.

CORN SOWN FOR FORAGE.

From the Agriculturist.

I made a visit to Maury county a few days since, and whilst the driver was changing horses at Spring Hill, I examined Mr. Moore's patch of corn sown broad cast, and think it will yield more succulent food than any piece of ground of the same size that I have ever seen. It is certainly very light; entirely unfit for work animals, but I am strongly inclined to believe that it will serve a most excellent purpose for milch cows, sows and pigs, and such stock as we are too much in the habit of neglecting during the summer and fall. I am now ploughing in my rye-stubble, and after it is well broken up, I shall harrow it with an iron tooth harrow, sow from two to two and a half bushels of corn to the acre and then harrow it again, for the purpose of feeding all my stock from the first of September until just before frost. Whatever is then remaining, I intend to cut and cure for winter food.

J. S., ED.

CAUTIONS FOR PURCHASERS OF SILK REELS. SILK CULTURE OF THIS YEAR.

To the Editor of the Farmers' Register.

Silk reels, bearing the name "Piedmontese," are for sale, at some places in the United States, that are not more than a semblance of the *genuine* Piedmontese reels. It therefore behoves persons intending to purchase reels to be on their guard.

The frame of the Piedmontese reel is 4½ by 3 inches thick; the *pretended* Piedmontese reels have frames made of timber about half that thickness, and the axle and *reel*, or arms, are proportionably light and trifling. The importance of having a strong reel is pointed out in the June number of the Farmers' Register, page 350.

My rearings of silk-worms up to this time (4th of August) have been successful. About 650 pounds of cocoons have been produced, at a cost of 20 cents per pound, including cultivation of trees, and interest on that portion of the value of the cocoonery which was used. If a sufficient supply of mammoth sulphur and pea-nut eggs had been on hand, the cost of the cocoons would have been reduced to 16½ cents per pound. This I consider a fair beginning, when it is recollected that the operations were carried on principally with negro boys. We operate entirely with hired labor, and of course are not left to conjectural estimates.

I intend to continue my rearings until the 1st of October.

LAYTON Y. ATKINS.

Stafford County, Va. August 4, 1840.

MARLING IN NORTH CAROLINA.

To the Editor of the Farmers' Register.

N. E. Branch of Cape Fear, July, 1840.

Having been enlightened on the use and application of marl, by your publications on calcareous manures, I feel disposed to make known to you some of the beneficial results of my experience.

In the winter of 1838-9, I marled, at the rate of (say) 300 bushels to the acre, eight acres of land cleared prior to the revolution; a part of it low, wet and unproductive; soil sandy, and based on clay. Planted with corn, had an improved crop, though not equal to my expectation, owing, as I supposed, to the dry summer. Sowed said land with oats in February, and harvested, I believe, at least one hundred per cent. more than I should have done without the marl; having had a crop of oats a few years since on the same piece of land that was scarcely worth harvesting.

In the winter of 1837-8, marled about 15 acres at the rate of 150 to 200 bushels per acre; planted said land in corn in the spring of '39; had an improved crop, especially where the land was flat and rather wet. Some sour places yielded from 50 to 100 per cent. more than ordinarily. This field is now abounding in a fine growth of fennel and weeds, evincing its improved condition.

In the winter of 1838 9, marled, I judge, at the rate of 150 to 200 bushels, ten or twelve acres of land abounding in cray-fish, low, wet and sour, yielding when at rest a growth of sour grass. I did not think my crop, owing to dry weather, equal to what I expected. This land now at rest, abounding, where marled, in a growth of fennel, which I consider as a guaranty to a future crop. On similar land, marled at the same time, and at rest in 1839, I have corn growing, which, I think, from its present appearance, will yield from 50 to 100 per cent. more than land adjacent and not marled.

For some years past I have been in the habit of marling swamp land recently cleared, soil sand, and vegetable deposite; where the pine and bay trees grew in many places, there was scarcely any yield, either from an excess of vegetable matter or acidity. By the application of marl, this was at once corrected; and I find marl not only to fertilize, but to protect against excessive wet.

The rock used is the same in appearance that you recently saw and analyzed at Dr. McRee's plantation, Rocky Point. I reside 4 to 5 miles from Rocky Point, on the opposite side of the river, and on the margin of the great Holly Shelter bay or pocoson. Lands wet and swampy.

The Bishop of Worcester said, that he who made two blades of grass to grow where but one grew before, might be considered a benefactor of mankind. How justly and eminently this remark applies to one who has written and labored so long for the benefit of agriculture, as the editor of the Farmers' Register, is but too manifest.

SAMUEL BLACK.

We are gratified to learn, from the foregoing communication, of more exceptions to the *general rule of neglect* of marling, in the interesting region in which the writer resides. Let the writer but persevere, and be judicious as well as energetic in his marling labors, and he will not only be amply rewarded individually, but the example afforded by himself, and a few others, will render service of incalculable value to the state of North Carolina, in which so little has yet been done, and so much

may be done, by the use of this rich and abundant mineral treasure.

Encouraging and beneficial as have been the results of our correspondent's application of marl, they would have been much greater, if his land had been previously better drained, than appears from his words. We also warn him against the error of relying on marl alone; or of the necessity of letting vegetable matters be furnished to the marled land, (by its own growth, or otherwise,) to obtain the largest profits from marling.—Ed.

DESTROYING BUSHES.

From the Maine Farmer.

The month of August has always been considered the best time in the year to destroy bushes, and it is firmly believed by a majority of farmers that the full moon of August is the very nick of time to give them their death blow.

We cannot say, nor have we yet found the man who could say from any actual comparative experiments which have been instituted, whether this was actually the case, or only an *ancient* belief, handed down from generation to generation. Be that as it may, if experience has proved that August, either in the full or the dark of the moon, is the best time to destroy bushes, it should be attended to during the time. We know, however, from actual experiment, that the most effectual mode of eradicating bushes is to tear them out by the roots. Alder bushes and elder bushes, which are very tenacious of life, can be effectually destroyed in this manner. A very large stout hook of iron is an excellent thing for this purpose. It may be attached to a chain, and a yoke of oxen will pull them out with ease and despatch. If a hook cannot be had a noose may be made round a clump of bushes by a chain or chains, a hand can bend the bushes over the contrary way from what the oxen are to draw, and thus they can be *twitched out* and completely eradicated.

There are but few farms in Maine where a week or two cannot be profitably spent in destroying bushes. And if those who have the means should thus employ their power in clearing some of the bush pastures there would be a great increase of food either for man or beast, and the appearance as well as the value of the country will be very much improved.

BERKSHIRE HOGS.

From the Farmers' Cabinet.

I find that the breeding of Berkshires is to be the order of the day for the present year; what a pity that our people will not be content without going with a locomotive force about every thing! They must, one would think, each have a small steam engine in his breast! and assuredly, in the breeding of Berkshires, they are going the whole hog. Here is one great man who declares that no Berkshire *can be a Berkshire*, unless he has three white feet and a white tip to his tail! but when pushed upon this momentous point, he confesses he only meant, that he must have *some* white hairs on the tip of his tail; how many, he saith not! Another, equally great in the profession of hog-breeding, declares that the pure-bred Berkshires must have *four* white feet and a *white tail;* for they must be *perfectly white;* none else being genuine; and all this, oftentimes, without regard to shape, points, or figure. I know a person in this neighborhood, who has a *Bement sow*, and a wretched looking animal *for a Bement* it is, with scarcely a good point, except the ear and the top of the tail, about her, but he had a *tip-top* pedigree with her, and that is his greatest consolation: another has a most splendid boar, but he *will not be comforted*, because he has no pedigree beyond the fifth generation.

Now what humbug is all this! But the best of it is, they are all wrong, as I, who was brought up amongst the Berkshire pigs in England, can testify; and I declare they were red or tawny, with black spots; this was always the legitimate color, and any one there would as soon think of a *blue pig* as a *white one*; but all this has been sufficient to create a speculation—a morus-mania, and that's enough. Now, by this time next year, the mania, I guess, will have passed away, and then we shall find that the best breeds of pigs in the world might be obtained from a cross between a good Berkshire boar, even if he have but *two* white feet and *no* white hairs in the tip of his tail, and some of the best of the Chester county sows, than which nothing finer can be found.

Since writing the above, I find a correspondent in the Cultivator has *broken ground* in favor of the red and black Berkshires, and I mean to help him: the description of a pure Berkshire, which he copies from the Complete Grazier, is worth preserving in your pages; it is as follows: "The specific characters of the true Berkshire hog are a reddish color, with brown or black spots; sides very broad; body thick, close, and well-formed; short legs; the head well placed; the *ears large* (!) and generally standing forward, but sometimes pendent over the eyes (!) The best are without bristles along the back, their hair long and curly." But, oh mores! not a word about the *tip of the tail!* Now how very different is the *true* Berkshire of the present day to the above portrait? It might be called a stuffed sausage.

But, after all, there is another breed of hogs in England, which will one day take precedence of the Berkshires for quality of meat, and these are the *Hampshires*: they are so notorious, that the people of that shire are called Hampshire *hogs*, as the people of Essex are called *calves*—Essex calves—that county being noted for the finest and fattest calves; and any person having resided in London, to which the best of every thing finds its way, must have heard mention made of Hampshire bacon, and tasted it too, and will bear witness to its great superiority; it always bears a higher price than any other brought to that market; the flavor is peculiar, and very different from that of the Berkshire, or any other breed; more tender; does not waste in cooking; the rind of the meat thick, but peculiarly juicy, and, what might be termed *gelatinous*. The hogs of this breed are all that need be desired in every way, and the estimation in which they are held in that part of England, will assuredly obtain for them a *run* in

the American market, after the Berkshires have had *their* run: but, how shall it be told! even the best breeds are found of different colors, and *sometimes* with less than three white feet and no white hairs in the tip of the tail! * * *

I shall add, the Hampshires are hardy, feed readily to a very large size, 6 or 7 hundred pounds being a common weight amongst the largest; while pigs of six or nine months are reared to great perfection. They are, in their own country, always fattened upon barley, ground into meal, which makes by far the best feed.

JOHN BANCROFT.

P. S. We hear much now-a-days of the fine handling of cattle—and truly there is no mistake about that—but why may we not introduce the same test of thrift amongst our hogs? it would be a pretty accompaniment to a *white tipped tail!*

Dutchess County, N. Y., July 29, 1840.

CONSIDERATION ON THE MEANS OF DIFFUSING KNOWLEDGE IN MARLING IN SOUTH CAROLINA.

From the Carolina Planter.

Some of the remarks of Mr. Ruffin, as copied from the *Farmers' Register* into the 20th No. of the *Carolina Planter*, would seem to militate against the utility of *geological surveys*. Speaking of the improvements that have taken place in the poor lands of Lower Virginia, by the use of marl, he says that "the Geological Survey had no more agency in producing this improvement than it had in exciting the Seminole war." And adds, "if it has produced any good effects to the general and agricultural interests of Virginia, of as much worth as the marling of even 100 acres of poor land, we confess that we are unacquainted with all such results." All this may, perhaps, be true. If I am not mistaken the beds of lime and marl in Lower Virginia were long known to the inhabitants, and it was not necessary therefore for the surveyors to point them out. But it certainly requires some sort of a survey to discover marl in places where it is not known to exist. You may adopt the specific term of marl survey if you please, or the generic term of geological survey—embracing the examination not only for marl, but also slate, quartz, granite, &c. &c., in short all the different substances that compose the earth; still a survey or examination is required; and I prefer the geological survey, as this will embrace not only the examination for substances that will benefit agriculture, but also the natural sciences and mechanic arts.

Let it not be supposed that because Mr. Ruffin has not seen good effects produced by the geological survey of Virginia, equal to the benefits arising from marling even 100 acres of poor land, that all geological surveys are of but little importance. Other states of the union have had mines of wealth developed by their geological surveys, and we do not know what is to be found in South Carolina, until the trial is made. We have had encouragement enough in the discoveries that have already been made, to commence a survey of the state; and the importance of the subject is certainly adequate to the small amount necessary to defray its expense. I have always been under the impression that a survey was necessary to develope all the resources of the state. Unless we have a survey how are we to know where marl exists.

QUERY.

Remarks in Reply.

The article referred to above was not designed "to militate against the utility of geological surveys" in general; and we are very ready to admit that such surveys, properly conducted, would be the most important means of discovering, making known, and bringing into use, the hidden mineral resources of a country; and, so far as these minerals are manures, of aiding essentially the progress of agricultural improvement. Still, we retract none of the assertions and opinions referred to above. The question then under consideration, and to which our comments particularly applied, was as to the utility and value of a geological survey for discovering *marl* and other mineral manures alone. On this point, we not only reassert all that was said before, but will further maintain, that, judging from every thing yet effected in this way, the discoveries of marl by any geological surveyor, and all useful results from such discoveries, would be beneath contempt, compared to those which have been and may easily be made by intelligent and observant cultivators, on their own and their neighbors' lands. Nor are geological and other scientific attainments necessary for such observations and discoveries. It only requires the time, leisure, opportunity, and fitness for careful and correct observation and collection of facts, which hundreds of agriculturists possess, and who, after all, are the persons who discover the important facts, which are afterwards gathered up and appropriated by geological surveyors. When things are ripe and ready for the commencement of a new improvement, any means which may be used for collecting and distributing knowledge thereon cannot fail to render service; and such would probably be the state of things now in South Carolina, marl being the subject of inquiry, and a geological survey being used as the means for diffusing knowledge thereof. But we nevertheless maintain, that by an agricultural survey, either general or limited, that particular object would be far better effected, and, at the same time, other important subjects of agricultural improvement be aided. We do not pretend to estimate the value of the geological survey of Virginia to agricultural interests. But of this we are very sure, that if as much money as the cost of the geological survey has been and will be, had been judiciously expended for an agricultural survey, that its benefits to a degree would have been greater, beyond the power of comparison.

But if in any way, direct or indirect, proper or

illegitimate, the attention of the cultivators of South Caroliha can be speedily and properly directed to this greatest of agricultural improvements, the measure will be the greatest benefit that can be conferred on that commonwealth. And even if it is preferred to seek that object by a geological survey, at an expense of $10,000 to be appropriated every year, as long as the liberality and patience of the legislature shall hold out, and the survey to continue just so long as it is so paid for, still the object, if thus indirectly gained, will be cheaply purchased, though at a hundred times the price of a more direct and proper mode. The proper and cheapest course would be a survey limited to the discovery and testing of marl, and giving instruction in regard to its proper application, in every part of South Carolina where it exists. And if this were done, and the information, thus afforded, were appreciated and acted upon generally, the benefits would be ten thousand fold greater than the cost.—Ed. Far. Reg.

STAGNANT WATER.

From the Cultivator.

Of all the causes that contribute to render soils poor and worthless, we believe there is none more active than stagnant water, on the surface or immediately below. Such soils are invariably close and tenacious, and commonly quite unproductive. Where there is a retentive subsoil, the surface generally abounds in clay, is difficult to work, and gives a less reward to labor than almost any other. This is owing to the stagnant water held by it, as none of the valuable plants can flourish in a soil so constituted. Land is liable to injury from this cause, on which water during wet weather rests on the surface for even a short period, for the roots of a plant cannot penetrate a soil freely, in which the density is such that rain water does not freely sink through it to the natural drains in the subsoil, below the ordinary range of the roots of plants. Water is essential to the growth and perfection of plants, but water that does not circulate, or which exists in too great quantities, is fatal to them; and the first thing to be done, is to free soil from this incumbrance, if we would give it productiveness, and render it easy of culture.

It is from these well known effects of stagnant water, when on the surface, or within reach of the roots of plants, that the necessity of draining arises, and which system of operating, when fully carried out, completely changes the character of lands submitted to such a course. Manures applied to soils abounding in stagnant water, can produce little effect; the salts they contain are diluted, and cannot produce that action, or circulation of atoms, which appears absolutely necessary to productiveness. In clay, or in stagnant water, where substances are not exposed to heat and atmospheric agencies, decomposition is slow. Every farmer knows that manures produce much more effect on loam, gravel, or drained clay soils, than on those so retentive as to have water on or near the surface. Draining them, and aeration, or the exposing the soil to atmospheric action, to the influence of the sun and air by deep ploughing, seems to be the only thing that can be relied on to correct this serious evil.

Instances indeed occur in which the wetness of land is produced by springs, which rising from the earth spread over it; but in far the greater number of cases, the stagnant water is owing to a retentive subsoil, that prevents the escape of such water as falls upon it. In either case, however, the remedy is the same; and in the language of Morton on Soils, complete and perfect draining is the foundation of all improvement in husbandry, and it should, therefore, be the first step which we take in attempting to improve or ameliorate the soil.

A very large proportion of the lands in this country, are of that class that suffer more or less from the accumulation of water. No person can traverse it in various directions, without being sensible of this fact; and in consequence of such liability to suffer, the land in many districts is cold and poor, as land not freed from stagnant water always must be. The hard pan lands which cover so large a portion of the country, may be named as belonging to this class, though some of these contain more clay than others, and are therefore more shallow and difficult to work than others, where the subsoil, although still too retentive, lies deeper, and is therefore not so injurious as the first kind is well known to be.

Much of this hard pan, when freed from its stagnant water, drained and ploughed, will become very fertile and productive; indeed there is no case in which a soil cannot by sufficient labor and expense, be made precisely what is desired. The native earths that go to constitute soils, the clay, sand, and lime, in themselves do not make a soil productive; properly mixed and proportioned they constitute a base for the action of the vegetable and animal manures, and the various salts or stimulating agents, that excite the organs of plants to vigorous action, and enable them to make these secretions from the matter furnished them, to be appropriated to the growth of the plants. Man, then, has only to do what nature in some cases has herself done; that is, so proportion the several ingredients that go to make a productive soil, that the desired result shall be attained. Chemical analysis has here come to the aid of the agriculturist, and shown him precisely the proportion of the earths, and the nature of the ingredients that are necessary to make a soil fertile, and the causes that tend to advance or retard such a consummation. Where water is too abundant, it must be removed by draining; where the soil is too compact, it must be loosened by deep or subsoil ploughing; where the proportion of clay is too great, sand must be added until it is sufficiently friable; if lime is absent, it must be added; if animal or vegetable matter is wanting it must be supplied; and if the soil is too light and porous, clay will be found a remedy most effectual.

Whatever difference of opinion, therefore, may be entertained of the best methods of freeing land from stagnant water, there can be no reasonable doubt of its propriety or necessity. To the farmer who has lands wet, cold, and difficult to cultivate, we would say, free your soil from all stagnant waters to the depth of eighteen or twenty-four

inches; loosen it to that depth, either at once or gradually, and there will be no difficulty, under a judicious course of cultivation, of producing on lands now of little value, all the most important products of agriculture.

THE OPPRESSION OF THE FENCE LAW, AND THE DAWN OF RELIEF.

Since the year 1835, when the petition to the legislature of Virginia for relief from the general law in regard to inclosures was rejected, very little has been said in this journal in regard to that subject, which before had occupied so conspicuous a place, and engaged the pens of so many correspondents. Our own silence, under this heaviest and most absurd of all the injuries imposed on agriculture by the legal policy of Virginia, was not founded on content, nor submission to this iniquitous system, by the operation of which agriculture, in the eastern half of Virginia, is annually robbed of more than half of its otherwise clear profits. Nor was it in despair of any mitigation of the evil, desperate as may be hopes of any aid being given voluntarily to agricultural interests by the legislature of Virginia, or of the legislature being urged to such action, for the first time since the Virginian declaration of independence, by the now demagogue-governed people. Our silence was caused by the belief that it would be more conducive to ultimate success in this matter, to leave undisturbed the seeds of reform which had been planted, to spring up, grow, and flourish, and show their good fruits, and thus to exhibit in their results manifest and undeniable evidence of the good operation of the change. At the same session at which the petition for a change of the general fence law had scarcely been permitted to be heard, another petition, which we had originated, and which asked only for partial, but yet very extensive relief, passed without opposition. We allude to the petition (published at page 450, vol. ii., Farmers' Register,) and the law passed in compliance therewith, for making the tide-waters of the James and Appomattox rivers and their tributaries "lawful fences." In asking for this great measure of relief, we took for example, and profited by as a precedent, a previously passed law for making the upper Appomattox a lawful fence. At every session since, and in answer to different petitions, other laws have been passed, extending the principle as to various other streams. No opposition has been made to this most valuable and fast extending mode of relief; and the more it is extended, the stronger are the reasons for continuing to extend it, in answer to other claims; and the more effectually is *right* aided by *precedent*, which even in aid of *wrong*, is far more powerful than truth and reason and justice, alone, when opposing old abuses. Fences along the borders of all water courses, and below as well as above the head of tide, are as much required by the general law of enclosures, as in any other situations; and they are much the most expensive lines to fence, and the fencing operation which is the least demanded by the usual circumstances of the lands and their proprietors. If, then the proprietors on all the considerable water-courses will ask for and obtain relief even thus far, this alone would avoid in lower and middle Virginia the now legal requisition of keeping up perhaps several thousands of miles of perishable and useless fences, which are maintained at an annual expense which, if so diverted, would pay the expense of all the *useless* part of the sessions of the legislature, or *almost* pay for constructing the James River canal. Let then this great, though partial measure of relief be obtained, for all localities to which it could not be denied; and then the advantages would be so manifest, so extensive, and the evils so small in comparison to the benefits secured, that proprietors generally would be satisfied of the magnitude and the uselessness of their still continuing burdens; and even *non-proprietors* would learn that they had lost nothing by the restraining of their now existing and time-honored *right of legal trespass* on their neighbors' lands. We are entirely assured that nothing is wanting but to see the operation of the change of system, to make it desirable to nine-tenths of the community.

There is another imperfect yet very important means of reform, and of relief from the existing tax of the fence law in certain situations, where the legal burden would otherwise be almost ruinous. This is by voluntary agreement of the proprietors of a number of contiguous farms to dispense with all fences, except a general enclosing fence of the whole neighborhood, and the separate enclosures for pasture, which each individual should have for his own stock, on his own ground. Such a measure we induced the commencement of, some ten years ago in the neighborhood in which we formerly cultivated and resided, in Prince George county; and the space so included has gradually been extended, until there are now twelve or more farms under one general surrounding fence. There are certainly some inconveniences and disadvantages found in this new plan, owing to there being no legal sanction to the agreement; and the performance of every man's obligations to his neighbors being governed only by his sense of duty and of self-interest. But even if the sense of moral obligation be weak, that of

self-interest is strong; and the latter principle of action is brought more and more into play, as the number of farms so enclosed together are increased. If any one of the individuals uniting in such a plan permits his live-stock to trespass, his own fields are likely to suffer worse than his neighbors'. With all the disadvantages incurred, in consequence of the absence of all support of right by law, in this respect, it is nevertheless certain, that under this plan of voluntary agreement, and without any separate surrounding fence, our own fields have been, in the general, better secured from trespassing animals, than before the adoption of the plan, and with all the previous protection of separate fences, and of the law against the trespasses of mischievous animals. Within this large general enclosure (including fully 5000 acres) there are parts now under profitable tillage, and annually improving in product, which before lay waste, because the proprietors could not afford to fence them separately; and if this beneficial agreement were now annulled, these, and much more of other tracts, would again become waste, for the like reason. And what is here so manifest, on a comparatively small scale, is in the continual course of operation throughout all the old settled parts of Virginia; but which is not seen or appreciated, or the great and growing evil not ascribed to its true and sole cause, the existing law of enclosures. There are now thousands of acres thrown out of culture, and rendered waste and worthless, and the quantity is annually increasing, because the expense of enclosing according to law is unquestionably greater than the profit of tilling the land. And there is perhaps twenty times as much land still kept fenced for cultivation, merely because it has been always so kept, and the expense never estimated, but which ought also to be thrown out of tillage, because yielding less than enough to maintain the separate fences.

Every old and extensively cleared neighborhood furnishes a proper field for action, for such a voluntary association, under a general ring fence. If prejudice at first opposes a more general extension, let two neighboring proprietors alone commence the plan. Others will soon desire to share the obvious benefits; and the space so enclosed will every year be extended. And there is little danger that any individual will desire to return again to the blessings of such protection of the law, who has once enjoyed exemption from the enormous tax of the altogether *useless* fencing required by law.

The increase of number and extension of such voluntary associations will, in time, cause the just claims of the numerous individuals concerned to be heard; and the aid of legal sanction will be given to the several voluntary obligations. The enactment of private laws for such objects, or rather of general laws permitting and sustaining such voluntary associations, under suitable regulation to maintain right, and redress wrong, between the parties, is all that would be necessary for relief from the great oppression and enormous tax which are now in full force. Then, those neighborhoods which now suffer most could obtain relief from the greater part of the grievance, without affecting the interests or even offending the prejudices of others; and the parts of the country not requiring such relief would continue to enjoy the benefit of the present general law and policy in regard to enclosures.

These remarks are submitted to our readers, as suggestions for different modes of action tending to promote the great and beneficial object in view. Let each one, who concurs in the general views, exert his influence to forward one or the other mode of procedure, and the agriculture of Virginia may in a few years be relieved of a burden which bears on it more heavily than the millions of public debt already incurred for the generally misdirected "internal improvements" of the state. —Ed. Far. Reg.

AGRICULTURAL MORALITIES.

From the Cultivator.

Messrs. Editors.—I am a plain man, not versed in metaphysical subtleties or legal abstractions, but I have my notions about right and wrong, old fashioned, perhaps; and I sometimes meet with things that rather run counter to my ideas of what is correct, and I wish to state some of my difficulties for you or some of your correspondents to remove, should you deem them worthy of notice.

There seems to be but one opinion respecting the men who wilfully injure the property of their neighbor. If I should poison the spring of my neighbor, mix arsenic with the oats fed to his horses, or feed nux vomica to his sheep, I should probably be committing an offence against the laws that would subject me to a deserved punishment. If I should girdle or cut down his apple trees, set fire to his woodlands or fences, obstruct his water courses, turn animals into his wheat fields, or turn his stock into the highways, I should deserve, and should receive, the execrations of every honest man, in addition to the exposing myself to retributive justice. All these are considered crimes, and their magnitude is estimated by the injury done or intended to be done to my neighbor.

Now I would ask where in *reality* is the difference between the above class of offences, and acts I shall now specify. I carry to market a load of clover seed, or a friend applies to me for a bushel for his own use. I know, but the buyers do not, that there is a plentiful sprinkling of Canada thistle seed in it, and that if sown on his farm, it will be

the means of stocking his soil with that pest of the farmer. I have some wheat that is in great demand for seed, I am aware that it is full of stein krout or charlock, but the purchaser does not notice their presence, and I make a good bargain in common parlance, by saying nothing about it. I have some corn, that resembles some valuable and celebrated variety, and I take advantage of the ignorance of my friends and others, to sell it to them for high prices, while I am aware that it has not a single feauture of the corn they imagine it to be. I might enlarge this catalogue of similar acts, but enough has been given to illustrate my meaning.

I repeat the question, wherein does the guilt of the man who feeds his neighbor's horses with arsenic, differ from his who sells his neighbor the seed of the Canada thistle? For my part I am simple enough to consider the latter the greater offence. The crime is the destruction of property. In the one case it is the destruction of a few animals that can be replaced: in the latter the farm itself is comparatively ruined. Ask a Pennsylvania farmer which he would choose, to lose his best span of horses by poisoning, or have his fifty or his hundred acres stocked with the thistle, stein krout or charlock; and if he understands the nature of these plants, he would not hesitate an instant. The injury in one case would be but a trifle, compared with the other; why then should not a corresponding estimate be formed of the crime?

I make these remarks because I do not imagine the crime of injuring others in these ways, is sufficiently realized by farmers and others. The man who puts off spurious animals for good ones; who sells impure or bad seed for clean or proper ones; who knowingly injures his neighbor or the public in these and other common methods of fraudulent imposition and puffing, is not to be held guiltless, because he does not put his hand in a pocket and extract its contents directly, or because he does not commit other overt acts against the majesty of the laws. *He does not do as he would be done by;* a plain unsophisticated test of conduct, to which all would do well to take heed; at least such is the opinion of an

OLD SCHOOL MAN.

BERKSHIRE HOGS.

From the Farmers' Cabinet.

Mr. Editor.—I have just seen a Bement, which, for the honour of old Berkshire, I trust is no *Bement*. It would be in vain to attempt to describe him, for from the sole of his foot to the crown of his head he is about one of the ugliest little wretches that can be imagined; his capacity for *improvement* is however great, for his belly would serve two such and to spare. If, however, upon trial, it might not contain quite all that *two* may wish to eat, there is a hollow behind his shoulders that would take some, and add not a little to his figure. But, strange to say, this pig is the best of four that were sent from Albany, to a person in this part of the country, as very superior—in short, as little *Bements!* Where the other three are located I know not; but if this pig were mine, he would soon find his way "back agin." I understand that his present possessor cannot believe that he is so old as he is represented to be—*he is so small.* This reminds me of the negro's pig, which, although he was very little, as the purchaser complained, Sambo assured him he was "berry ole." There is, however, a *Lossing* in the same pen with him, which has been sent to show the difference; he is much better to be sure, but if that gentleman would come this way some day, the owner could show him a pen of pigs a single Berkshire cross that would astonish him, although he is not a native.

Now, I have a strong suspicion, that the four very inferior pigs above-mentioned, were pigs of the first litter--and if so, all is accounted for; for it is a fact that I have often proved, the first litter of pigs are always very inferior, and it is oftentimes with difficulty that they can be raised at all --I should say *never* to *credit* or *profit*, unless the breeder has an order for pigs from persons living at a distance, who are pretty sure to come in for the cullings after the best have been selected by the purchasers *in person*,—then, there might be profit, but I should prefer the *credit*, I must confess. The fact has been so long known, namely, that pigs of a first litter are always inferior, that out of it has grown the old adage, "The calf of a young cow, the pig of an old sow," that is, for rearing stock; and I have had repeated proofs of the truth of the observation.

There is no one who approves more of the Berkshires as a cross than I do, but I fear there are *some men in some parts* who are hasting to grow rich; and there is another proverb, you know--but which I am not of course going to apply to them—which says, "he that hasteth to grow rich will scarcely be"—but there———. SIAM.

N. J., July 30, 1840.

THE SMALL FARMS OF BELGIUM.

[From the 'Third Report of George Nicholls, Esq., containing the Result of an Inquiry into the Condition of the Laboring Classes and the Provision for the Relief of the Poor in Holland and Belgium.]

The extensive manufactures which at no very remote period flourished in Belgium appear to have congregated a numerous population of artisans in and around the great towns. As the scene of manufacturing industry changed, this population was deprived of its means of handicraft employment, and was compelled to resort to the cultivation of the soil for subsistence. This seems to have been the chief, though possibly not the sole origin of the system of small farms, which still prevails, and which are cultivated by the holder and his family, generally without other assistance. The farms in Belgium very rarely exceed 100 acres. The number containing 50 acres is not great. Those of 30 and 20 acres are more numerous, but the number of holdings of from 5 to 10, 15, and 20 acres is very considerable, especially those of the smaller extent; and to these I chiefly confined my inquiries.

The small farms of from five to ten acres, which abound in many parts of Belgium, closely resemble the small holdings in Ireland; but the small Irish cultivator exists in a state of miserable privation of the common comforts and conveniences of civilized life, whilst the Belgian peasant farmer

enjoys a large portion of those comforts. The houses of the small cultivators in Belgium are generally substantially built and in good repair: they have commonly a sleeping-room in the attic, and closets for beds connected with the lower apartment, which is convenient in size. A small cellarage for the dairy, and store for the grain, as well as an oven, and an outhouse for the potatoes, with a roomy cattle-stall, piggery, and poultry-loft. The house generally contains decent furniture, the bedding sufficient in quantity; and although the scrupulous cleanliness of the Dutch may not be every where observable, an air of comfort and propriety pervades the whole establishment. In the cowhouse the cattle are supplied with straw for bedding; the dung and urine are carefully collected in the tank: the ditches had been scoured to collect materials for manure; the dry leaves, potato-tops, &c. had been collected in a moist ditch to undergo the process of fermentation, and heaps of compost were in course of preparation. The premises were kept in neat and compact order, and a scrupulous attention to a most rigid economy was every where apparent. The family were decently clad, none of them were ragged or slovenly, even when their dress consisted of the coarest material. The men universally wear the blouse, and wooden shoes are in common use by both sexes. The diet consists to a large extent of rye bread and milk; the dinner being usually composed of a mess of potatoes and onions, with the occasional addition of some pounded ham or slices of bacon. The quantity of brown wheaten bread consumed did not appear to be considerable. I need not point out the striking contrast of the mode of living here described, with the state of the same class of persons in Ireland; and it appears important to investigate the causes of this difference.

In the greater part of the flat country of Belgium the soil is light and sandy, and easily worked; but its productive powers are certainly inferior to the general soil of Ireland, and the climate does not appear to be superior. To the soil and the climate, therefore, the Belgian does not owe his superiority in comfort and position over the Irish cultivator. The difference is rather to be found in the system of cultivation pursued by the small farmers of Belgium, and in the habits of economy and forethought of the people. The cultivation of the small farms in Belgium differs from the Irish —1st, in the quantity of stall-fed stock which is kept, and by which a supply of manure is regularly secured; 2d, in the strict attention paid to the collecting of manure, which is most skilfully managed; 3rd, by the adoption of a system of rotation of five, six, or seven successive crops, even on the smallest farms, which is in striking contrast with the plan of cropping and fallowing the land prevalent in Ireland.

In the farms of six acres we found no plough, horse, or cart; the only agricultural implement, besides the spade, fork, and wheelbarrow, which we observed, was a light wooden harrow, which might be dragged by hand. The farmer had no assistance besides that of his wife and children, excepting sometimes in harvest, when we found he occasionally obtained the aid of a neighbor, or hired a laborer at a franc per day. The whole of the land is dug with the spade, and trenched very deep; but as the soil is light, the labor of digging is not great. The stock on the small farms which we examined consisted of a couple of cows, a calf or two, one or two pigs, sometimes a goat or two, and some poultry. The cows are altogether stall-fed, on straw, turnips, clover, rye, vetches, carrots, potatoes, and a kind of soup made by boiling up potatoes, peas, beans, bran, cut hay &c. into one mess, and which being given warm, is said to be very wholesome, and to promote the secretion of milk. In some districts the grains of the breweries and distilleries are used for the cattle, and the failure of the Belgian distilleries has been reckoned a calamity to the agriculture of the country, on account of the loss of the supply of manure which was produced by the cattle fed in the stalls of these establishments.

The success of the Belgian farmer depends mainly upon the number of cattle which he can maintain by the produce of his land, the general lightness of the soil rendering the constant application of manure absolutely necessary to the production of a crop. The attention of the cultivator is always therefore especially directed to obtain a supply of manure. Some small farmers, with this view, agree with a sheep-dealer to find stall-room and straw for his sheep, to attend to them, and to furnish fodder at the market price, on condition of retaining the dung. The small farmer collects in his stable, in a fosse lined with brick, the dung and urine of his cattle. He buys sufficient lime to mingle with the scourings of his ditches, and with the decayed leaves, potato-tops, &c., which he is careful to collect in order to enrich his compost, which is dug over two or three times in the course of the winter. No portion of the farm is allowed to lie fallow, but it is divided into six or seven small plots, on each of which a system of rotation is adopted; and thus, with the aid of manure, the powers of the soil are maintained unexhausted, in a state of constant activity. The order of succession in the crops is various; but we observed on the six-acre farms which we visited plots appropriated to potatoes, wheat, barley, clover (which had been sown with the preceding year's barley), flax, rye, carrots, turnips or parsnips, vetches, and rye for immediate use as green food for the cattle. The flax grown is heckled and spun by the farmer's wife, chiefly during the winter, and we were told that three weeks' labor at the loom towards the spring enabled them to weave into cloth all the thread thus prepared. The weavers are generally a distinct class from the small farmers, though the laborers chiefly supported by the loom commonly occupy about an acre of land, sometimes more, their labor upon the land alternating with their work at the loom. In some districts, we were informed, every gradation in the extent of occupancy, from a quarter or half an acre, to the six-acre farm is to be found; and in such cases more work is done in the loom by the smaller occupiers.

The labor of the field, the management of the cattle, the preparation of manure, the regulating the rotation of crops, and the necessity of carrying a certain portion of the produce to market, call for the constant exercise of industry, skill, and foresight among the Belgian peasant farmers; and to these qualities they add a rigid economy, habitual sobriety, and a contented spirit, which finds its chief gratification beneath the domestic roof, from which the father of the family rarely wanders in

search of excitement abroad. It was most gratifying to observe the comfort displayed in the whole economy of the households of these small cultivators, and the respectability in which they lived. As far as I could learn, there was no tendency to the subdivision of the small holdings: I heard of none under five acres held by the class of peasant farmers, and six, seven, or eight acres is the more common size. The provident habits of these small farmers enable them to maintain a high standard of comfort, and is necessarily opposed to such subdivision. Their marriages are not contracted so early as in Ireland, and the consequent struggle for subsistence among their offspring does not exist. The proprietors of the soil retain the free and unrestricted disposal of their property, whether divided into smaller or larger holdings. The common rent of land is about 20*s.* an acre, and the usual rate of wages for a day laborer is a franc (or 10*d.*) a day.

A small occupier, whose farm we examined near Ghent, paid 225 francs per annum for about two bonniers, or six acres of land, with a comfortable house, stabling, and other offices attached, all very good of their kind; this makes the rent (reckoning the franc at 10*d.*) equal to 9*l.* 7*s.* 6*d.* sterling per annum; and if we allow 3*l.* 7*s.* 6*d.* for the rent of the house, stabling, and other offices, there will be 6*l.*, or 1*l.* per acre for the land, which accords with the information we obtained at Antwerp, Brussels, and other places, as to the rent of land in the flat country, the soil of which is generally of the same quality throughout. This farmer had a wife and five children, and appeared to live in much comfort. He owed little or nothing he said, but he had no capital beyond that employed on his farm. We questioned him respecting his resources in case of sickness. He replied that if he were ill, and his illness were severe and of long duration, it would press heavily upon him, because it would interrupt the whole farm work; and in order to provide for his family and to pay the doctor, he feared he should be obliged to sell part of his stock. If his wife and family were long ill and he retained his strength, the doctor would give him credit, and he should be able to pay him by degrees in the course of a year or two. The thought of applying for assistance in any quarter appeared never to have entered his mind. We suggested that the Bureau de Bienfaisance, or charitable individuals, might afford him aid in such a difficulty; but, with evident marks of surprise at the suggestion, he replied cheerfully that he must take care of himself. If a sick club or benefit society were established among these people, so as to enable them by mutual assurance to provide for the casualty of sickness, the chief source of suffering to their families would be obviated, and there would be little left to wish for or amend in their social condition.

EXTRAORDINARY SALE OF FOXHOUNDS.

The most remarkable sale of hounds ever known, took place a few days ago at Hyde-park-corner; the lots were thirteen in number, making 127 hounds exclusive of whelps; their produce was 6,511 guineas, *or upwards of one hundred pounds per couple!* The pack which realised this enormous sum was "the Osbaldeston," which has hunted the old Berkeley county (Hertfordshire) under the mastership of Harvey Combe, esq.; the Earl of Cardigan was one of the principal buyers.

WILD SILKWORMS OF ASSAM AND THEIR PRODUCTS.

From the Penny Magazine.

The warm climate and prodigious variety of insects of the southern parts of Asia has recently induced Europeans to examine such parts of that quarter of the world as are open to them, with a view to finding other caterpillars which produce silk as well as the common silk-worm, and perhaps also some kinds which may be able to feed themselves and spin their webs in a wild state, without demanding the plantation of mulberry-trees, and the unremitting attendence which that insect requires. It has been long known that several species of wild silk-worms exist in India, and millions of cocoons are annually collected in the jungles of that country and brought to the silk factories of Calcutta: it is said that these insects cannot be domesticated, because the moths take flight as soon as they are produced; but the experiment has been tried, on a small scale, of keeping them under a mosquito curtain, and found to answer; it would seem, however, that in a country where they are produced and maintained spontaneously in great abundance, there would be little advantage in domesticating them, unless the produce were greatly improved by cultivation, which the experiment does not state. The only attention now required is to gather the cocoons when formed; in addition to which, in some parts of India, the natives remove the young worms from the jungles, and transfer them to trees which grow near their own dwellings, where they may be defended from the dangers to which they are liable, and where the cocoons can be more easily collected.

The province of Assam, on the banks of the Brahmaputra, which until the termination of the Burmese war was nearly closed against Europeans, is now an English dependency: its resources have been investigated, and, among a variety of hitherto unknown productions, nearly a dozen species of silk-worms have been found there, some of which have been long cultivated by the Assamese, and large quantities of the produce exported to the neighboring countries. One of these is the muga-worm, which feeds on a variety of trees, and is never reared in the house. We may begin our account of the muga from the hatching of the eggs, which are deposited by the females on wisps of dry grass. These wisps the natives expose to the sun for about ten days, when a few worms begin to show themselves. They are then hung up in a tree which has been selected for the purpose, and as the young worms hatch successively, they find their way one after another to the leaves of the tree. To prevent them from coming to the ground, fresh plantain leaves are tied round the trunk of the tree, on the smooth surface of which they are unable to crawl; if any worms fall off, they are carefully picked up and replaced on the tree, round which the ground is cleared of jungle that they may be more readily

seen if they fall. When once placed upon the tree the worms feed themselves, and so far they cause much less trouble than the mulberry-worms which must have the leaves brought to them; but they must not by any means be left to themselves, as they are subject to the assaults of many enemies. The first against which it is important to protect them is the ant, which must be destroyed before the worm is placed upon the tree. To effect this the trunk is rubbed with molasses, and hung with fish and dead toads and frogs; and the ants, which are collected by the smell, are burned by fire; this process is repeated until not an ant is left near the tree. The worms, when they grow larger, are tempting morsels for many birds, which lie in wait upon the neighboring trees, and never fail to pick off a few when not closely watched. Their nocturnal enemies are rats, bats, and owls, whose ravages can never be entirely prevented.

The worm thrives best and produces the finest silk in dry weather; but it is not seriously injured by rain unless very heavy, as it invariably conceals itself under the leaves on the approach of a shower. It soon destroys all the leaves of one tree, and is then removed to another, by means of bamboo dishes fastened to the ends of long poles, which are raised among the branches; it crawls upon these dishes, which are then placed against a fresh tree, to the leaves of which the hungry worm soon finds its way. During thirty days the muga-worm remains upon the tree; it has four moultings like the ordinary silk-worm, but requires no particular attention on that account. At length when ready to spin it begins to descend the tree, but is stopped by the circle of plantain leaves. Here it is gathered in baskets, brought into the house, and placed beneath bundles of dried leaves suspended from the roof: in these bundles they spin their cocoons, which are generally stuck two or three together.

The process is after this not very different from that employed with the common silk-worm. The cocoons, with the exception of such as are selected for the next brood, are exposed to the action of heat, to destroy the chrysalis, they are then boiled for an hour in a weak solution of potash, and wound off; not reeled in one continuous thread like common silk, but spun like cotton or worsted. This of course produces a thicker and harsher thread, but it has not been practicable to follow a better method; though it is likely that further experiments and greater skill may be found to overcome the difficulty. The separation of the worms before spinning would probably keep the cocoons more perfect, and consequently easier to wind off. It would also be necessary to prevent piercing the cocoons; a practice resorted to by the hill tribes for the purpose of getting at the chrysalis, which they consider a great dainty: this of course destroys the continuity of the thread.

The muga is a good deal larger than the mulberry worm. It measures, when full grown, nearly four inches in length, and is then transparent, of a bright yellow color, with small red and brown spots; it makes a cocoon about two inches long, and of proportionate thickness. It feeds on a variety of trees, most of which spring up spontaneously in spots cleared for the cultivation of rice or cotton, and the color and quality of the produce vary according to the species of tree on which the worm is fed. These trees are usually transplanted to the neighborhood of the dwellings of the peasantry, to whose comfort the manufacture of muga-silk largely contributes; as it affords a profitable occupation to the youngest and weakest of the family, whose services would be unavailable for any other object: in fact, except at hatching and spinning-time, these worms require little more than close watching to prevent the intrusion of enemies; and this can be done by children, or very old persons, or by those who are employed in spinning, weaving, or basket making, the ordinary occupations of the peasantry of Assam.

The total duration of a breed of worms is about seventy days, and it is repeated five times in the year. An acre of land produces about fifty thousand cocoons per annum making twenty-five pounds of silk, which is worth from 6*l.* to 7*l.* of our money. It is estimated that 50,000 lbs. are annually made in Assam, of which somewhat less than a half is exported. It sells from 5*s.* to 5*s.* 6*d.* per lb., and is woven into cloth for scarfs, turbans, sashes and similar articles.

Another valuable and important silk-worm is the eria or arindy worm. This is reared entirely in the houses of the peasantry, and is fed chiefly on the palma Christi, or castor-oil plant, which requires little culture. Although the eria-worm is reared wholly under cover, it does not demand so much attention as the mulberry-worm; though there is no very imporant difference in their management. When they spin, they are put into baskets filled with dry leaves, in which they make their cocoons, like the muga-worms, in bunches of two or three together. The worms before they spin are either white or green, and it is remarkable that the white ones invariably spin red silk, and the green ones white. They are not reeled, but spun like the muga cocoons.

It is conjectured that more than 80,000 pounds of eria silk are annually in Assam, and nearly all this large quantity is consumed in the country: it is the constant dress of the poorer classes, and, in the cold season, of the richer also. The stuffs made from it are at first coarse and stiff, but repeated washings cause them to become silky, soft, and glossy.

The cultivation of this worm appears to be worth more attention than has hitherto been given to it; it grows rapidly, and twelve broods have been perfected in one year. It is reared in almost every house in Assam, and may be increased to any extent. The silk, though coarse, is warm and durable, and may be bought in the cocoon at little more than a shilling a pound. One account of it says, "It gives a cloth of seemingly loose coarse texture, but of incredible durability; the life of one person being seldom sufficient to wear out a garment made of it, so that the same piece descends from mother to daughter." A small sample sent to England was judged by some manufacturers to be an excellent article for making shawls like those of Cashmere. In addition to the silk, the castor-oil which is produced from the palma Christi might also be taken into the account, as little or no injury results to the plant from stripping it of leaves to feed the worms.

The other recently discovered silk-worms are of less importance at present, though some of them are likely to be useful eventually. One sort, the deo-muga, produces a beautiful thread of great

lustre, and though now confined to Assam, feeds upon the pipala tree (ficus religiosa) which grows abundantly all over India. Another sort is of very large size, the moths measuring ten inches from wing to wing. Of several others the distinguishing characteristics are as yet scarcely known; but as the attention of Europeans in India has been called to this subject, it is not likely that any really valuable sort will long remain undiscovered.

THE GENERAL FAILURE OF SILK-WORM REARINGS, THIS SEASON.

Although there have been sundry cases of good success this year in raising silk-worms, it is nevertheless certain that the far greater number of trials have resulted in general or entire failure. In most cases, no doubt, abundant causes for failure were to be found. The unusual quantity of rain, and prevalence of damp air—the unfitness of the buildings—the trusting to eggs from diseased worms—the watery and weak kind of food presented in young multicaulis leaves of the most forced and tender growth—and bad management in general—one or all have served, (and could hardly have failed,) to produce most of the disasters which have occurred. But, in some other cases, where every care was used, and no labor or expense spared that was deemed necessary, the results have been almost as disastrous as any. We confess our utter inability to account for such extensive failures; which are so much the more mysterious as compared to the general marked success of last year, in this part of the country, wherever eggs of healthy stock were used.

The grounds of our own false confidence, in very different results, are already before the readers of this journal. Last year, a quantity of silk-worm eggs, sent to Petersburg for sale, began to hatch as early as the 13th of April. The hatching eggs and worms were given to every person who would take them; and thus some twenty or more individuals, in this neighborhood, and at much greater distances, were induced to make their first trials. There being no previous preparation, or suitable arrangements, all these feedings were necessarily conducted under great disadvantages; and, in every case, the worms must have suffered much from cold and wet weather, want of food, want of space, or want of cleaning, and generally, from *all* these evils; yet, in all these trials, we heard of no case of disease, not so much indeed as of a single worm in a whole rearing; and every lot of worms, that did not suffer from absolute starvation, (as some did in this town,) produced satisfactory results. Our own experiment, and ignorant practice, with a portion of these worms, was stated at length in the 6th number of our last volume; and our disadvantages and bad management were not worse, nor the success greater, than those of several others of our intimate acquaintance, of whom we inquired, and heard their progress and results. In the same season and sometimes under the care of the same individuals, other broods from other sale eggs were as much diseased, and proved as entire a loss, as is the general state of things this year. These broods we naturally inferred to be (as most likely they were,) the produce of diseased stocks; and we also inferred, from the different results in other cases, that with good eggs, and good management, a rearing could scarcely fail of success. The particular stock of worms which had proved to be so universally healthy, we even designated by the name of "hardy," and attached peculiar value to them, because of their so well deserving that character in all the rearings of 1839. Yet, from our own eggs of that valued stock, carefully saved as supposed, we have not this year saved an egg, because none of the broods were healthy; and other persons who thought as highly of the stock, and whose management and arrangements were much better than ours, have fared no better, and have lost the whole brood from their crops of eggs, as we did of our own.

But discouraging as these numerous and unaccountable failures are, we trust they will not induce the abandonment of the business, by any one who before desired, and *is prepared*, to carry it on; but they ought to induce increased care in management, and caution in limiting the extent of early trials. It is certain that *without proper arrangements* failure will be inevitable. We have lost nothing of our previous and entire distrust of eggs from sickly worms and suspicious sources. But we *have* lost the confidence, so entirely felt, in the healthiness of worms produced from known healthy parents. We pretend not to solve the mystery, nor even to guess at any sufficient or satisfactory causes of the general state of disease among silk-worms this season. But we incline to believe that much of it may be justly attributed to the total disregard of Dandolo's rules for preserving eggs. Instead of guarding them carefully, as he directs, during the whole time of their keeping, against dampness, and extremes both of high and low temperature, all the eggs in this country have been exposed to some or all of these evils; and all of us have supposed that this exposure could do no harm, because eggs greatly so exposed had been found to hatch well. But most of the careful experimenters of this year must now be satisfied that eggs may hatch well, and the worms live, and thrive for some time afterwards, and yet the stock be so tainted, n some way, as

that most of the worms will perish before maturity. There must be some sufficient cause for such general and mysterious effects; and the discovery of it may yet give to silk-culture in Virginia as fair prospects of success, as it had in our overweening confidence, before the occurrence of the failures of this season. Any information on this subject, or opinions from older and better experimenters, we shall be pleased to receive and lay before the public. None will be more gratified than we shall be, to have this great and unexpected obstacle to silk-culture removed. But, in the mean time, neither the pride of opinion, nor unwillingness to confess mistake and ignorance, shall, in this, or any other case, prevent our stating fairly and truly the existing circumstances, adverse as they may be to our previous anticipations, and even mortifying to our confident self-conceit.—ED. FAR. REG.

REMARKS AND INQUIRIES IN REGARD TO MR. SELDEN'S CHANGE OF ROTATION.

To the Editor of the Farmers' Register.

I had prepared a communication for your July number, advocating an improved three-field course of crops now in progress on my farm. But before it was mailed, accident attracted my attention to a reperusal of the communication of John A. Selden, esq., published in the January number of the Register, detailing a contemplated five-shift rotation. My mind was so forcibly impressed with the superior advantages of his course, and the conclusive reasoning by which it is sustained, that I abandoned the intention of entering the arena as a principal, and have been content to enlist as a subaltern under the banner displayed from Westover. This, to a proud mind, plentifully top-dressed (as Mr. Garnett would say) with agricultural conceit, is, perhaps, a humiliating confession. But truth vanquishes pride, and sincerity impels the avowal, that, for *a wheat farm*, Mr. Selden's rotation *can*, in my judgment, have no superior. His reasoning is based on a perfect knowledge of vegetable physiology; and there cannot be a shadow of doubt, but his theory, when reduced to practice, must result in entire success.

There is but one difficulty that has presented itself; and as the contemplated system has nearly run the first year of its course, it can be cleared up, and I trust, in your columns, Mr. S. will give the necessary explanation. In detailing his plan, he says, "as the oat crop is so valuable a one with me for feeding my teams, I propose seeding one-third of the field intended for peas in that crop, and *on which I propose to put my manure*. Should the manuring extend farther than the third for oats, I propose putting the remainder of the manured land in pumpkins, and the balance of the field of course in peas, &c." To this apportionment of the precedent crops on the field designed for wheat, I have no objection, but have serious doubts, whether he can do full justice to his manure heap. Oats are, or ought to be, sown early in March—too early, I should think, to break up the winter farm-pens and haul their crude and unfermented contents to the field. I have never found manure made in the winter in a proper condition to apply to any crop earlier than April; and without some extraneous management it would be, I imagine, less so in March. I trust the attention of Mr. S. will be drawn to the subject, and that in your next number, he will, as addenda to his communication, detail his management of manures, and the mode by which it is prepared for a crop so early sown as that to which it is given.

R.

HEN'S EGGS.

From the Farmer's Cabinet.

I notice in the Farmers' Cabinet for 4th mo. last, p. 275, an inquiry as to the truth of the assertion, that hen's eggs which are *round* produce female chickens, and those which are *long* or pointed, produce males.

When a boy, I was in a situation to be able to indulge my fondness for fowls, and often raised chickens;—without ever having heard of the above facts, I discovered that the eggs which approached the nearest to roundness always produced females, and those which were pointed at one end always produced males—I acted accordingly, and always succeeded in obtaining females or males, according as I wished.

After a lapse of a number of years, being in Philadelphia market, I happened to mention the fact to one who raised chickens for sale, and who preferred the males, because they grew larger—the information was received with some surprise; but I advised the person to try it, and afterwards was informed of the entire success of the experiment, all males being produced by selecting the long or pointed eggs.

I since find the fact was mentioned by a writer over 2000 years ago. I. H.

MONTHLY COMMERCIAL REPORT.

For the Farmers' Register.

Within the past week two new steamers have arrived from England; one in the unprecedented short passage of ten days and some hours, from Liverpool to Halifax, N. S., with dates to 4th of August. The weather had been fine, and harvest had commenced with favorable prospects of an average, but not a large crop.

These accounts have tended to depress the price of flour in our northern markets, whence large shipments of grain and flour were in progress. Cargoes of rye are now sent to the Mediterranean, whence we derived large supplies during the last few years.

The very short crop of wheat in Virginia causes prices not only to be supported, but to advance; and they now range from 100 to 120 cents per bushel; prime quality is scarce, and indeed the supply of all sorts less than usual. The deficiency is believed to exist in all the Atlantic states, except on their western borders. Flour may be quoted $5\frac{1}{4}$ to $5\frac{3}{4}$. Corn 45 to 50 cents. Tobacco has not varied much in price—ranging from $3\frac{3}{4}$ to $11—the demand good. The inspections in

Virginia will be about 55000 hhds.; the largest for many years. A great number of vessels are now loading for all parts of Europe, and the warehouses will soon be nearly emptied.

Exchange on New York continues at 3 to 3½ prem.: and on England 9½ to 10. X.

August 24, 1840.

WHEAT AFTER OATS.

From the Lexington (Va.) Gazette.

In preparing the ground for this crop, many farmers are in the practice of turning down the stubble as soon as the oat crop is taken off, with the view, as they say, that the oats left on the ground may vegetate, and be ploughed under for the wheat crop. I have tried this plan several times, and in no instance have I succeeded well. My wheat was always too light on the ground, and in one or two instances (the winter being mild) the crop was mixed with oats. The most successful method with me, and one by which I have never failed of a full crop, is this: If the season is dry, immediately after harvest, harrow down your stubble that all the seed may come in contact with the ground—but if late the harrowing may be dispensed with—then turn in stock enough to eat it close and glean it well. Sheep and hogs are preferable, but cattle and horses may be added if necessary, though heavy stock should be kept off in wet weather. The equinoxial rains of September seldom fail to vegetate any grain that may be left by the stock. About the first week in October plough your land as deep as you can, taking care to cover every thing that may be on the surface, and then sow and harrow your wheat, first in the direction of the furrows and afterwards across them.

It may be asked, why is this mode preferable to the usual practice. I answer, because by the usual practice, which is two ploughings, the ground is made too light, and the comparatively exhausted surface soil which produced the oat crop, is thrown up to produce the crop of wheat. The consequence is that much of the wheat fails. On the contrary, if the oat stubble be ploughed but once, the surface soil which had produced the oat crop is thrown under, and the vegetable matter which was turned under by the spring ploughing, is again thrown up in the very best state for the wheat crop. There is too, obviously, a great saving of labor.

These views are founded on my own experience and observation. If you think others may be benefited by them, you may give them a place in your farmers' department.

JOHN RUFF.

P. S. As oat land is apt to be too mellow, it ought to be left with more clods on it than any other preparation.

CONTENTS OF THE FARMERS' REGISTER, NO. VIII. VOL. VIII.

ORIGINAL COMMUNICATIONS.

	Page
Observations on the earliest marled districts of Prince George county	484
Queries to ascertain the action of shell marl as manure, and answers as to the oldest marled district in Prince George county, Va.	489
Answers to Queries:	
I. By James B. Cocke, of Bonaccord	491
II. By John B. Bland, of Fountains	492
III. By Edw. A. Marks, of Burley	492
IV. By John H. Marks, in regard to Old Town farm	493
V. By Lt. Harrison H. Cocke, U. S. N., in regard to Evergreen farm	493
VI. By Elgin Russell	494
VII. By Dr. Bland, of Jordan's Point	494
VIII. By Edmund Wilkins, of Springfield farm	495
IX. By William Wilkins	495
X. By Richard M. Harrison, of Huntington farm	495
XI. By Edmund Ruffin, in regard to Coggin's Point farm	496
Concluding remarks, on the Queries and Answers	497
Cautions for purchasers of silk reels. Silk culture of this year	500
Marling in North Carolina	500
Editorial reply to "Query"	502
The oppression of the fence law, and the dawn of relief	504
Remarks and inquiries in regard to Mr. Selden's change of rotation	511
Monthly commercial report	511

SELECTIONS.

	Page
Potato planting	449
Making and curing hay	449
Journal of a recent visit to the principal vineyards of Spain and France—concluded	450
Articles used as food for horses	469
Sun-flower plant	480
The hollow horn	480
Recapitulation of the effects of calcareous manures	481
Bots, and their cure	497
Agriculture in Massachusetts—morals of labor	498
To preserve cucumbers from insects	499
Chicory	499
Corn sown for forage	500
Destroying bushes	501
Berkshire hogs	501
Consideration on the means of diffusing knowledge in marling in South Carolina	502
Stagnant water	503
Agricultural moralities	505
Berkshire hogs	506
The small farms of Belgium	506
Extraordinary sale of fox-hounds	508
Wild silk-worms of Assam, and their products	508
Hens' Eggs	511
Wheat after oats	512